

THE INDUSTRY'S RECOGNIZED AUTHORITY

# ROCK PRODUCTS

LARGEST PRODUCER CIRCULATION IN THE HISTORY OF THE FIELD

MAY  
1952



Britain's newest  
cement plant

**SPECIAL FEATURE — New Developments in Europe**



**... for WILLIAMS SUPER-SLUGGER  
CRUSHER reducing power shovel stone  
to 2" or smaller in ONE OPERATION**

The Super-Slugger is designed for big reduction jobs, either as regards size of feed or hourly output.

Generally one Super-Slugger will do the work of a primary and several secondary reduction units, eliminating connecting conveyors and additional foundations, drives, etc.

Material is reduced by the Williams Hammer Principle with heavy hammers crushing the material by impact until of proper size to pass through the grate or cage. Eight standard sizes available.

WC81-7

**WILLIAMS PATENT CRUSHER AND PULVERIZER CO.**  
800 St. Louis Avenue. St. Louis 6, Missouri



**WILLIAMS ALSO MAKES:**

Heavy-duty hammer mills in smaller sizes for all quarry operations; impact and roller mills for 200 to 325 mesh grinding; drier mills; air separators; vibrating screens; steel bins; complete "package" crushing and grinding plants.

# WILLIAMS



**CRUSHERS**

**GRINDERS**

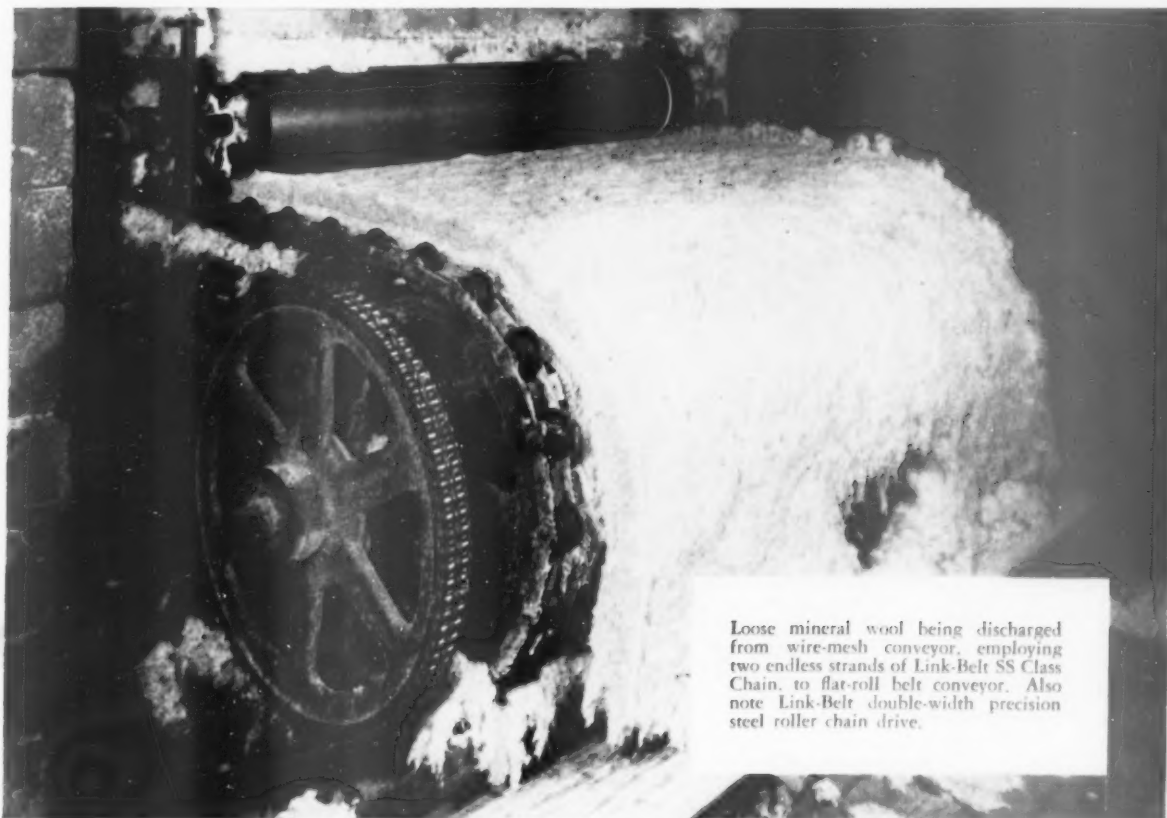
**SHREDDERS**

OLDEST AND LARGEST BUILDERS OF HAMMER MILLS IN THE WORLD



*No ONE chain serves every purpose*

## LINK-BELT makes a Complete Chain Line



Loose mineral wool being discharged from wire-mesh conveyor, employing two endless strands of Link-Belt SS Class Chain, to flat-roll belt conveyor. Also note Link-Belt double-width precision steel roller chain drive.

**... recommends the right one for your job**

Typical chains from the complete LINK-BELT line



Class SS bushed roller chain with straight sidebars—for practically any conveying or elevating service.



Class C combination chain—popular, durable, low cost design for elevators, conveyors.



Class SS bushed roller chain with offset sidebars—for heavy drive service at moderate speeds.



Class 800 lev bushed chain—for heavy duty, severely abrasive conveying and elevating.

More than strength—more than uniformity—all operating qualities are taken into consideration by Link-Belt engineers when they recommend a chain for your job. From the most complete line of chains, they can select the *right* type to meet your specific requirements—large or small. And all are built to the highest standards. Accurate control of materials and manufacturing processes is your assurance of longer chain life.

LINK-BELT COMPANY: Chicago 9, Indianapolis 6, Philadelphia 40, Atlanta, Houston 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8, Springs (South Africa), Sydney (Australia). Offices, Factory Branch Stores and Distributors in principal cities. 12,775-A

**LINK-BELT**

**CHAINS AND SPROCKETS**



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ROCK PRODUCTS is published monthly by MACLEAN-HUNTER Publishing Corporation, 309 West Jackson Blvd., Chicago 6, Illinois; Horace T. Hunter, President; E. R. Gauley, Vice-President; Ralph K. Davis, Secretary. Copyright, 1952. Entered as second-class matter, Jan. 30, 1936, at the Chicago, Ill. post office under the act of Mar. 3, 1879. Additional entry at Long Prairie, Minn. ROCK PRODUCTS is indexed regularly by Engineering Index, Inc. and the Industrial Arts Index.

### SUBSCRIPTION INFORMATION

Subscription Price: United States and Possessions, Canada one year, \$2.00; two years, \$3.00; three years, \$4.00. Pan American, one year, \$4.00; two years, \$7.00; three years, \$10.00. All other foreign, one year, \$6.00; two years, \$12.00; three years, \$15.00. Twenty-five cents for single copies. Canadian subscriptions and remittances may be sent in Canadian funds to ROCK PRODUCTS, P. O. Box 100, Terminal "A," Toronto, Canada. To Subscribers—Date on wrapper indicates issue with which your subscription expires... In writing to have address changed, give old as well as new address.

RESEARCH KEEPS

# B.F. Goodrich

FIRST IN RUBBER



## Now you can see the difference between grommet belts and ordinary V belts

*B. F. Goodrich grommet V belts last longer, serve better, save money*

THE "X-ray" belt, made of transparent material, was developed just to show you the exclusive B. F. Goodrich grommet construction. Now you can look beneath the surface of a V belt, see for yourself what makes B. F. Goodrich grommet V belts last longer, keep running with fewer interruptions, need less attention.

**Note the twin grommets**—Each of these grommets is like a giant cable except that it's *endless*—a cord loop built up by winding heavy cord on itself. It has no overlapping ends. Because most of the failures in ordinary V belts occur in the region where cords overlap, the endless cord section

in a grommet V belt eliminates such failures.

**Concentrated cord strength**—All of the cord material in a B. F. Goodrich grommet multiple-V belt is *concentrated* in twin grommets, positioned close to the driving faces of the pulley. No layers of cords to rub against one another and generate heat; cord and adhesion failures are reduced.

**Better grip, less slip**—Grommet belts have more rubber in relation to belt size. Without any stiff overlap, they're more flexible, grip pulleys better. Size for size, grommet belts give  $\frac{1}{3}$  more gripping power, pull heavier loads with a higher safety factor. Be-

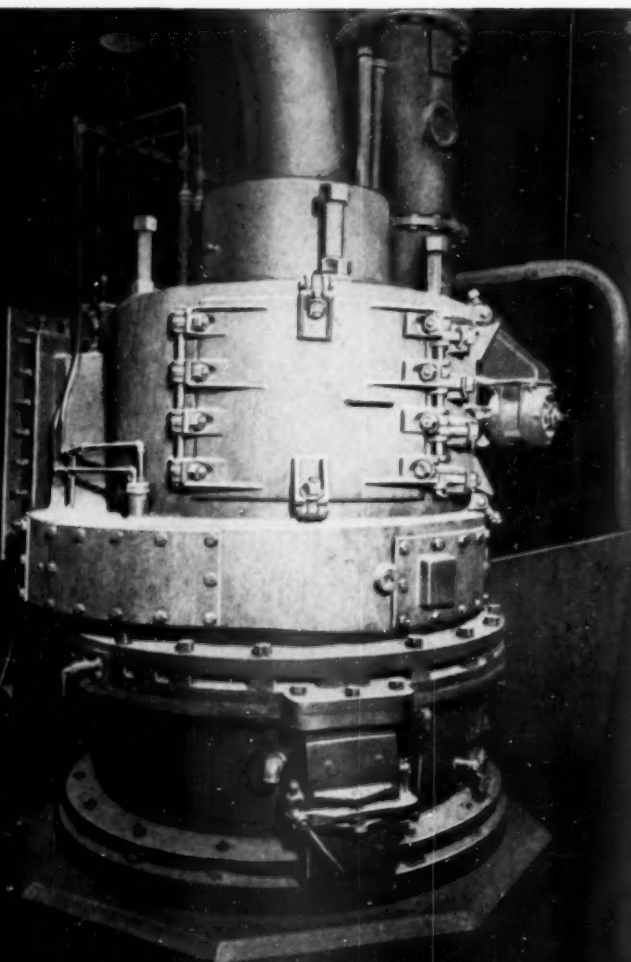
cause there is less slip, there is also less surface wear.

**Only B. F. Goodrich has the grommet!**—No other multiple-V belt is a grommet V belt (U. S. Patent No. 2,233,294). Now available in C, D and E sections. Your local BFG distributor has an "X-ray" demonstrator belt and will be glad to show it to you. *The B. F. Goodrich Company, Industrial & General Products Division, Akron, Ohio.*

*Grommet V Belts* BY  
**B.F. Goodrich**  
RUBBER FOR INDUSTRY



A Product of  
B&W Engineering  
for Economy



**BUILT TO**  
*Save*

**POWER  
MAINTENANCE  
OPERATING LABOR**

Long-lasting, ball-bearing grinding elements; wear resistant alloys in the grinding zone; ability to handle high-moisture coals; a well-engineered drive that gives years of trouble-free service—these are among the many features that make B&W's Type E Pulverizer the ultimate for economical direct-firing of all types of kilns.



**BABCOCK  
& WILCOX**

# TRAXCAVATOR.<sup>®</sup>

## OPERATION GIVES **BIG** PRODUCTION...



### 135 Cubic Yards Loaded Each Hour!

**P**RODUCTION is on the upswing at Dee Nickols & Sons' gravel plant near Soap Lake, Washington, as an HT4 TRAXCAVATOR gives the daily output a big boost by loading out 135 cubic yards of gravel each hour.

The TRAXCAVATOR crowds over 1¼ yards into its bucket that has been designed for faster, easier loading. The bucket is raised as the unit

turns and travels to the truck. The load is dumped, quickly and cleanly, with the operator in positive command of the action.

The operation is steady, fast and free of trouble, for TRAXCAVATORS have been designed and built to work thousands of profitable hours without special attention. Their "Caterpillar" Diesel Tractor mates give ample traction and power for any quarry job.

You can give your pit or quarry production a boost with fast, steady TRAXCAVATOR operation. Ask your "Caterpillar" Dealer about the five TRAXCAVATOR sizes, (with capacities from ½ to 4 cubic yards) . . . or write direct.

CATERPILLAR TRACTOR CO., Peoria, Illinois

## TRACKSON

A SUBSIDIARY OF CATERPILLAR

TRAXCAVATORS<sup>®</sup>  
TRACLOADERS  
PIPE LAYERS  
ANGLEFILLERS



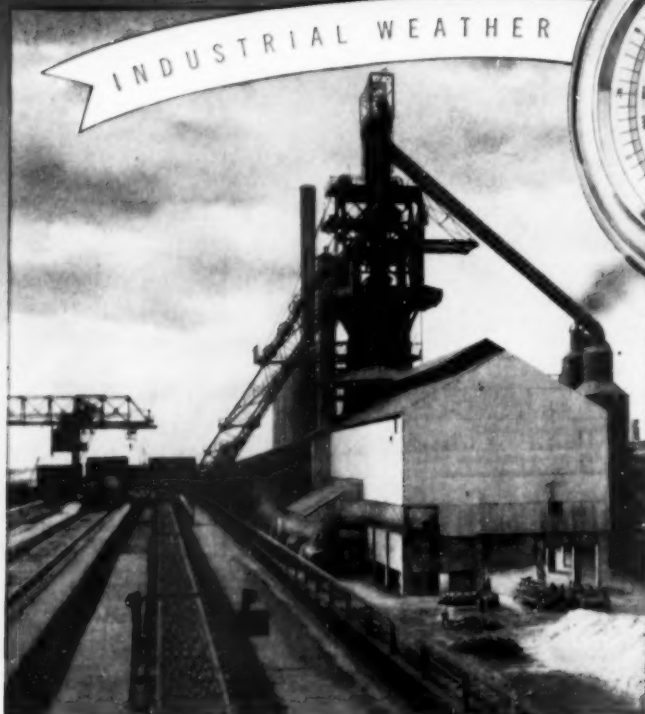
After-blast clean-up proves a simple task with a TRAXCAVATOR. Puncture-proof tracks give sure-footed agility to get the job done quickly and economically.

# Steel

BULWARK OF FREEDOM AND...

BAROMETER OF

INDUSTRIAL WEATHER



Sheffield Blast Furnace—First to utilize Texas iron ore and coke from Oklahoma coal in a fully integrated at-home steel making operation.



Look at the activity of steel making and you look at a dependable business forecast.

West of the Mississippi and East of the Rockies, good business weather has long been reflected in the ever expanding facilities and activities of Sheffield Steel.

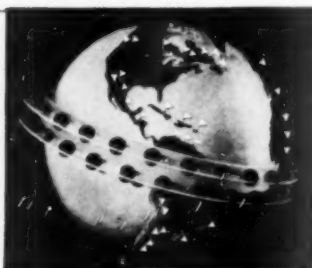
Within the last ten years, Sheffield's at-home steel making capacity has more than doubled. Sheffield Steel has expanded into a fully integrated at-home steel making operation from mining the raw materials to mill finished and fabricated steel products.

Look at the Sheffield customer list and you see the names of the leaders in manufacturing, agriculture, transportation, construction, oil, etc. With them, Sheffield Steel is proud to march in step with the greatly accelerated growth of what very aptly has been termed—the inner stockade of the garrison for freedom.



**SHEFFIELD  
MOLY-COP**  
COPPER-MOLYBDENUM  
ALLOY  
*Grinding Balls*

USED and PROVED  
ALL AROUND THE WORLD



IRON AND STEEL

**SCRAP**  
MEANS . . . . .

**MORE STEEL FOR AMERICA**  
*More Money In Your Pocket!*

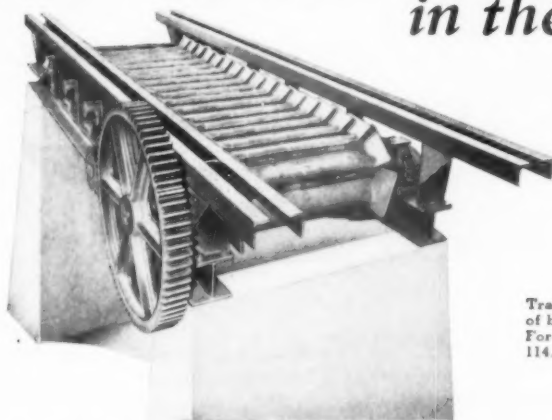
**GET YOURS OFF TO**  
THE DEFENSE LINES NOW!





*in the good old days...*

*the "paved" road ended a few feet outside of town. At the whim of the weather, travelers "ate dust" or bogged down in axle-deep mud. Today, over 3 million miles of paved road leads us smoothly wherever we wish to go.*



Traylor Apron Feeders will increase production of both primary and secondary crushers 80%. For complete details, ask for Traylor Bulletin 114.

**AS OUR ROAD SYSTEM** spread with the growth of our nation, the need grew for increased production of aggregate—foundation of the modern highway. For 50 years, Traylor has been a leader in providing the stone products industry with new and more efficient stone crushing machinery to keep pace with the need for increased production. Now, and in the future, you can rely on Traylor's growing fund of experience to provide the machinery that will help you do your job better.

# Traylor

**ENGINEERING & MANUFACTURING CO.**  
475 MILL ST., ALLENTOWN, PA.

Sales Offices: New York • Chicago • Los Angeles  
Canadian Mfrs: Canadian Vickers, Ltd., Montreal, P. Q.



Gyratory Crushers



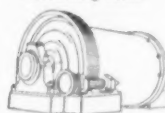
Reduction Crushers



Jaw Crushers



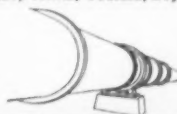
Grinding Mills



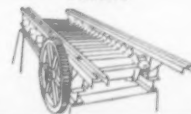
Crushing Rolls



Rotary Kilns, Coolers, Dryers



Feeders



**A TRAYLOR LEADS TO GREATER PROFITS**

## NO. 3 OF A SERIES

ON HOW TO

# Stretch a MULTIWALL Paper Bag

It is just good business to get the best possible use from your multiwalls. Here are some of the ways to do it . . .



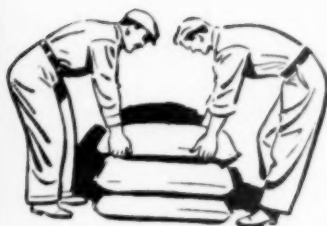
**Use of Hand Trucks . . .** Trucks (and chutes and conveyors) should be free of protruding nails, splinters, etc.

Two-wheel trucks should have wide, extended lips, as narrow-blade lips cut into the sacks. Wood or metal



lip extensions may be added. Sacks should be piled flat. Small wooden pallets may be used if the truck lip is adequate.

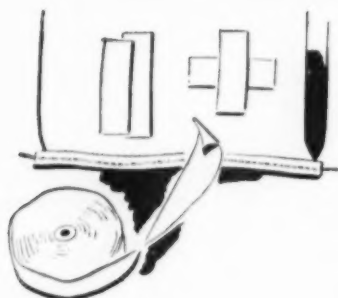
On four-wheel trucks, sacks should be stacked flat and even with the truck edges, with the end sacks interlocked.



**How to Lift and Carry . . .** One man should pick up the sack with his hands underneath it, preferably at diagonal corners. Two men should lift the sack with the hands underneath it, supporting the four corners.



Never grip or pull at the corners. Never drag the sack across the floor. Never, with a tied closure, pull at the closed end. Carry the sack with the edge resting against the body, or flat on the shoulder.



### How to Repair or Overslip Damaged Bags

If seriously damaged, slip an overslip over the damaged bag (with contents intact), then close with a wire-tie or string, or roll the top down and staple it.

If the damage is minor, or an overslip is not available: **1.** Straighten paper near the tear; place torn ply or plies in original position; clean off any loose material or dirt. **2.** Apply moistened gummed tape, cut 4 or 5 inches longer than the tear. Use single, overlapping, or crossed patches, depending on size and kind of tear. **3.** If more than one ply is severely ruptured, patch each ply separately.

A 3-inch, 40-lb. or 50-lb. gummed kraft tape is satisfactory. Carry repaired sacks with the patched side up.

### Want the Whole Story?

Ask your Bemis Man for free, illustrated copy of Bemis Multiwall Packaging Guide. It deals with Storage, Filling and Closing, Handling, Palletizing and other important subjects.

• • •

*If you need cotton or burlap bags also, Bemis is your best source.*

# Bemis



St. Louis 2, Missouri

# They Cut Tire Costs on the Toughest Jobs

**M**ORE and more pit and quarry operators use these high-stamina Goodyears to cut their tire costs—because these great tires are designed specifically to give maximum performance on particular types of hauling. And because they handle these tough pit and quarry hauls better, last longer, and deliver lower costs when the figures are totaled up—these Goodyears are first choice with cost-wise operators. Experience will show you, too, that it pays to BUY and SPECIFY Goodyear.

Road Lug—T. M. The Goodyear Tire & Rubber Company, Akron, Ohio



*That's why*

**MORE TONS ARE HAULED ON**

# GOOD YEAR

**TIRES THAN ON ANY OTHER KIND**

ROCK PRODUCTS, May, 1952

## ROAD LUG

Dual-purpose tire operates both OFF and ON the road. Combines off-the-road toughness and traction with on-the-road mileage and economy.

## HARD ROCK RIB

Companion tire for front wheels in rock work—easier steering, smooth rolling, same cord body, same shoulder and sidewall as the Hard Rock Lug.

## HARD ROCK LUG

Super-tough champ for all types of rock work. Its armored body and extra-heavy lugs assure longer wear, better performance, even in the toughest going.



# ***NOW!... a Revolutionary***



## **Chrysler Industrial Engineers Again Shatter Precedent! Develop Advanced Design With Larger Bore and Ingenious New Over-head Valve Arrangement! Make Long-desired Hemispherical Combustion Chamber Practical For Mass Production Methods**

To the long list of Chrysler "Engineering Firsts" now is added another!

For many years, engineers have known that the Hemispherical Combustion Chamber produces the highest volumetric and thermal efficiency, exceptionally good combustion characteristics, and had excellent adaptability to high compression ratios. But all previous attempts to incorporate this design into a mass-produced engine had been unsuccessful.

After five years of intensive research, Chrysler Engineers attained this goal.

With only 2.3 per cent more displacement, this mighty new Chrysler Industrial V-8 delivers 33 per cent greater maximum horsepower and a 16 per cent higher maximum torque. Its performance is incredible. Its fuel economy is outstanding. Its durability unexcelled. In operation, it is amazingly smooth and quiet. Over-all efficiency is tremendously increased.

# ***NEW CHRYSLER INDUSTRIAL***



***Most Sensational  
Engine Ever Developed For  
Industrial Power***

Yet, it has greater compactness and less weight.

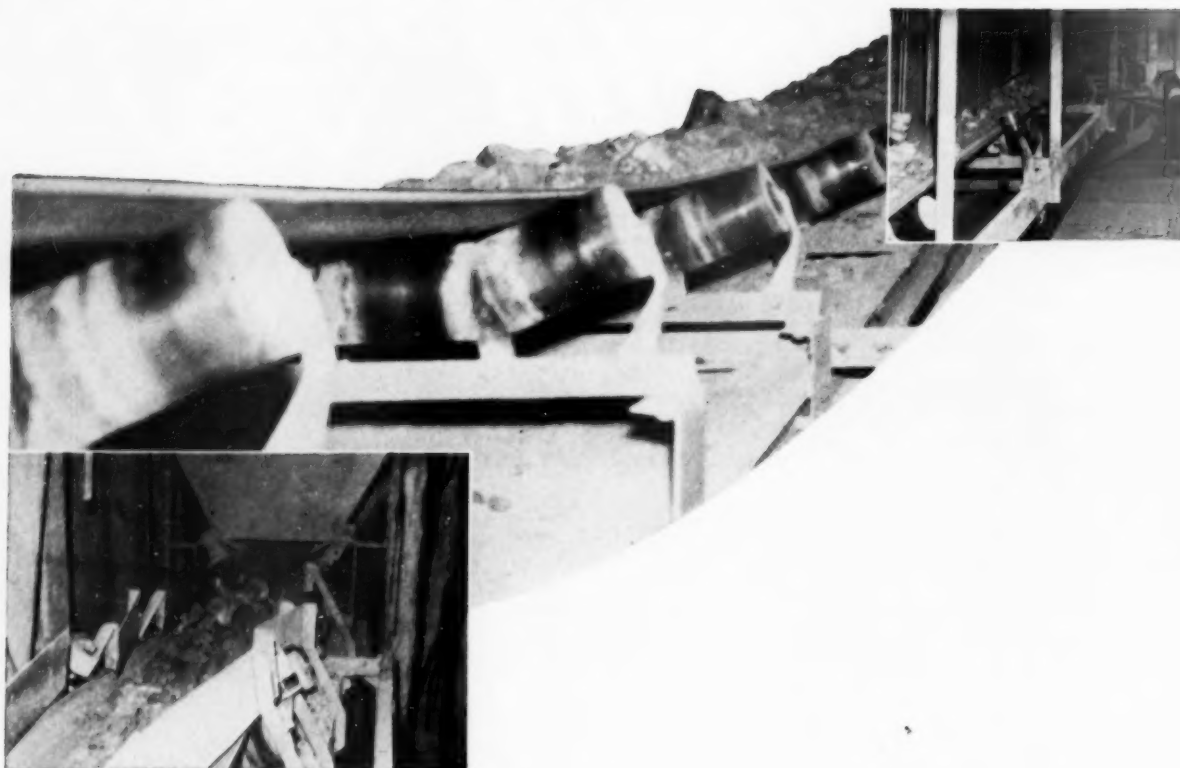
Among its unique design features are a water jacketed throttle body that prevents "icing," integral automatic choke and double breaker ignition distributor.

This sensational new Industrial Engine will give you a whole new conception of industrial power and Industrial Engine performance.

Let us show you what it will do for you. See your Chrysler Industrial Engine Dealer, or if your job involves special engineering, write us direct. Marine and Industrial Engine Division, Chrysler Corporation, 12200 E. Jefferson Avenue, Detroit 31, Michigan.

***CHRYSLER***  
**Industrial Engines**





## REPUBLIC CONVEYOR BELT SAVES HANLEY COMPANY ➤ 93% belt replacement cost. ➤

● Hanley Company operates a modern tile and brick-making plant in Summerville, Pa. Basic ingredient of their product is hard, abrasive fire clay. The clay is dumped into a primary crusher at the tipple, and then moved on Republic Conveyor Belting to a scalping screen, where the fines are separated from coarser lumps and dropped into storage bins preparatory to pugging, extrusion and baking.

A single 504-ft. length of 20-inch wide Republic Super Excelo Conveyor Belt handled the entire job (carrying more than 1,625,000 tons of material without mishap) for a 10-year period. Then, in July of 1948, the company installed some new production equipment and the old conveyor system became 18 feet too short. It seemed like an ideal time for belt replacement, but —

"Nothing doing!" said Charles E. Bates, Vice-president in Charge of Production. "The original

belt had a perfect performance record and was in excellent condition. Ten years' service out of a Republic Belt didn't seem unusual. I simply ordered an extra 36-foot section of the same type Super Excelo Belting and had it spliced in position. That was four years ago. I saved 93% of the total replacement cost and the belt's still rolling along as good as ever!"

Yes, Mr. Bates, we expect it is. Many Republic Rubber Conveyor Belts and other Industrial Rubber Products have been in use for a quarter of a century and more. But we appreciate such loyalty and enthusiasm. As the leading specialized producer of Industrial Rubber Products, Republic will continue to offer more performance for less money.

Remember, if it's made of rubber, Republic builds it better. Contact your local Republic Distributor or write direct for a free analysis of your plant requirements.

INDUSTRIAL RUBBER PRODUCTS BY  
**REPUBLIC RUBBER DIVISION**

Lee Rubber & Tire Corporation  
YOUNGSTOWN, OHIO







# The rock keeps rolling

"Over 99 per cent of our aggregate has been going to Fort Randall Dam. They're always in a hurry for it. Our 'Cat' Diesel Engines haven't failed us yet."

The two unfailing engines described by Cliff Hardcastle, operator of a rock-crushing plant in Alexandria, South Dakota, are "Caterpillar" D364 Diesels. The hard-working pair are used to power a 30-in. primary gyratory crusher and a 5½-ft. secondary cone crusher in the plant owned by Tobin Quarries, Inc., of Kansas City, Missouri.

Ten hours daily, the "Caterpillar"-powered plant grinds out an average of 250 tons of aggregate an hour. The Diesels take choking dust and lime conditions near the dam without sputtering because of their efficient dust seals.

Ruggedly constructed, the "Cat" Diesels are able to weather conditions that would flatten lesser engines. They pay for their keep in more work and less down-time.

Of course, even the best engines require attention to keep them in good operating condition. A few minutes of preventive maintenance daily on your "Caterpillar" power plants will reward you with increased life of your equipment. And behind the engines stand the complete, quick service facilities of your "Caterpillar" Dealer.

CATERPILLAR TRACTOR CO. • PEORIA, ILLINOIS

## CATERPILLAR

REG. U. S. PAT. OFF.

DIESEL ENGINES  
TRACTORS • MOTOR GRADERS  
EARTHMOVING EQUIPMENT

# How Costs are Cut in BARYTES Production

**DRYING  
GRINDING  
SEPARATING**

Combined in **ONE** Operation  
with the

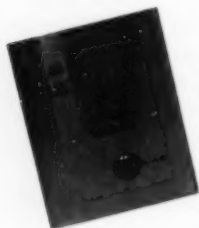


## RAYMOND ROLLER MILL

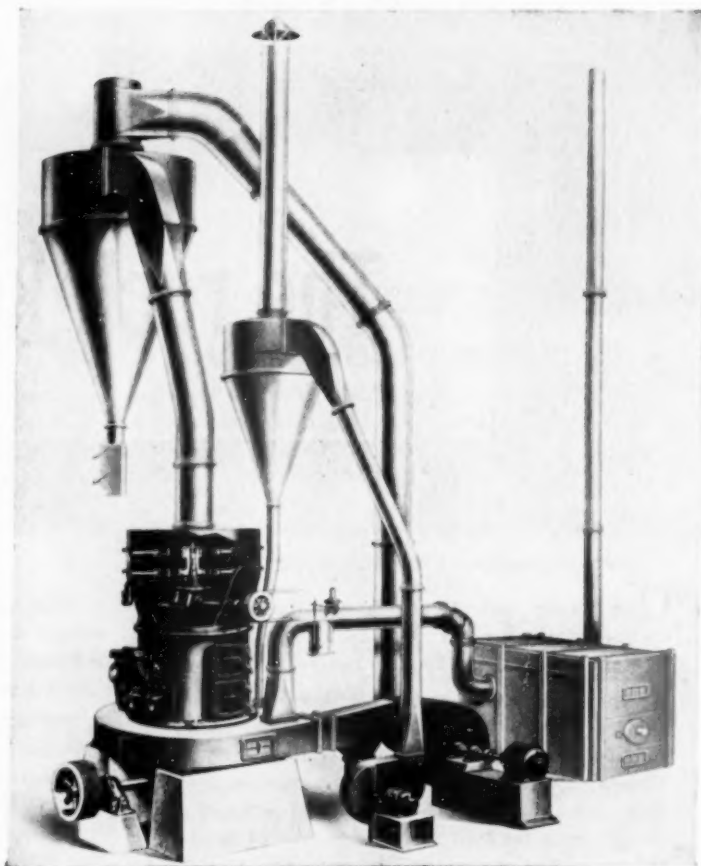
The key to economy in Barytes grinding, as in handling many other materials in the non-metallics field, consists in the use of the Whizzer-type Flash Drying-equipped Raymond Roller Mill for the complete operation.

Typical performance is shown by a Raymond installation of a Super Roller Mill provided with Flash Drying accessories to dry and grind Barytes in a single simultaneous process. The mill takes the raw feed containing 5% to 6% initial moisture, and delivers 9½ to 10 tons of product per hour at a fineness of 95% passing 325 mesh with a final moisture content of less than one-quarter of one per cent.

This method offers definite advantages in plant simplification, ease of controlling the product, automatic dust-free operation, minimum attendance and supervision, low maintenance expense, high tonnage rate per horsepower, as well as long, dependable service.



For other applications pulverizing non-metallic minerals refer to Raymond Catalog No. 69.



Typical arrangement of the Raymond Roller Mill with Flash Drying accessories.

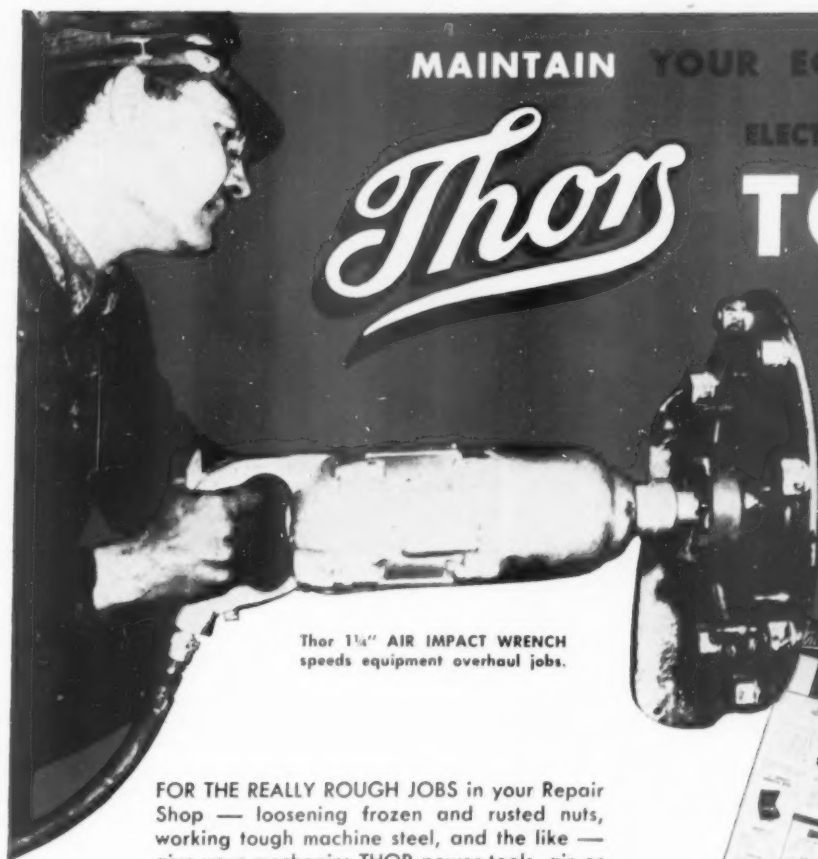
**COMBUSTION ENGINEERING - SUPERHEATER, INC.**  
*Raymond*  
**PULVERIZER DIVISION**

1307 North Branch Street  
Chicago 22, Illinois

Sales Offices in  
Principal Cities

MAINTAIN YOUR EQUIPMENT WITH

# Thor TOOLS



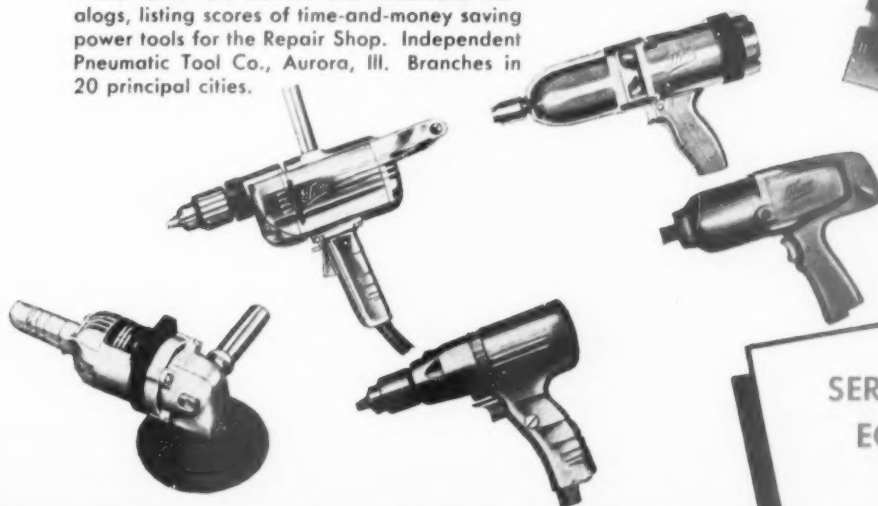
Thor 1 1/4" AIR IMPACT WRENCH speeds equipment overhaul jobs.

THOR manufactures a complete line of portable electric and pneumatic tools, used worldwide for the manufacture and maintenance of machinery and equipment.

FOR THE REALLY ROUGH JOBS in your Repair Shop — loosening frozen and rusted nuts, working tough machine steel, and the like — give your mechanics THOR power tools, air or electric. You'll find rugged THOR tools speed the whole repair cycle, saving their initial cost many times over in short periods of time. Write for THOR Electric and Pneumatic Catalogs, listing scores of time-and-money saving power tools for the Repair Shop. Independent Pneumatic Tool Co., Aurora, Ill. Branches in 20 principal cities.



SEND FOR THESE TOOL CATALOGS!



SERVICE YOUR EQUIPMENT WITH

*Thor*

THE TOOLS THE MANUFACTURERS USE!



IMPACT WRENCHES



VALVE REFACERS

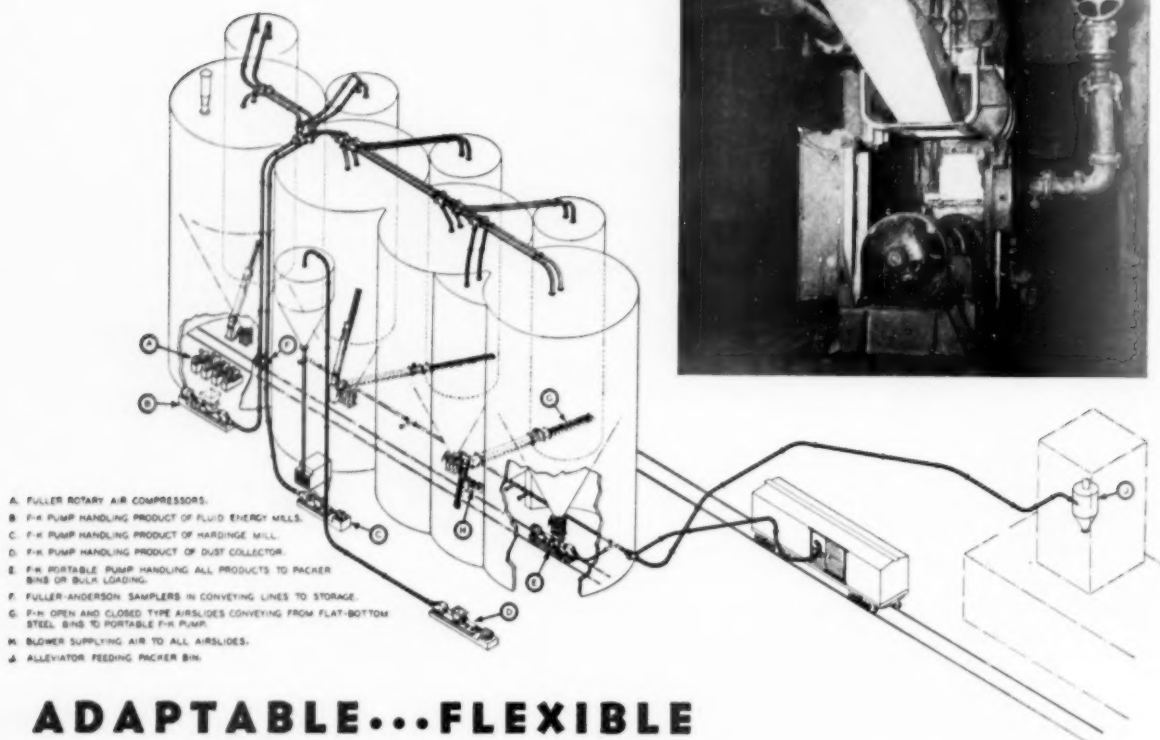
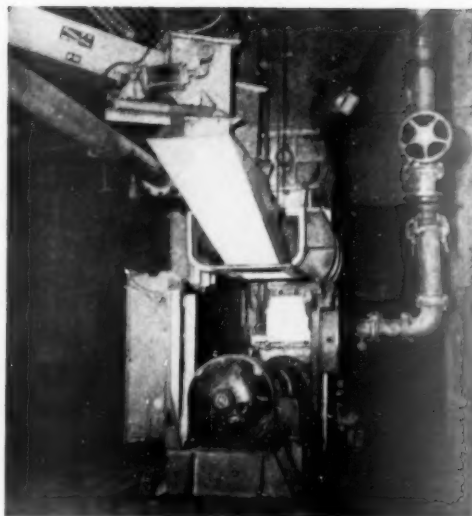


VALVE SEAT GRINDERS



DRILLS

Fuller-Kinyon Portable Pump underneath silos. F-H Airlide (upper left) from flat-bottom bin, for delivery to pump.



- A. FULLER ROTARY AIR COMPRESSORS.
- B. F-K PUMP HANDLING PRODUCT OF FLUID ENERGY MILLS.
- C. F-K PUMP HANDLING PRODUCT OF HARDINGE MILL.
- D. F-K PUMP HANDLING PRODUCT OF DUST COLLECTOR.
- E. F-K PORTABLE PUMP HANDLING ALL PRODUCTS TO PACKER BINS OR BULK LOADING.
- F. FULLER-ANDERSON SAMPLERS IN CONVEYING LINES TO STORAGE.
- G. F-K OPEN AND CLOSED TYPE AIRSLIDES CONVEYING FROM FLAT-BOTTOM STEEL BINS TO PORTABLE F-K PUMP.
- H. BLOWER SUPPLYING AIR TO ALL AIRSLIDES.
- I. ALLEVIATOR FEEDING PACKER BIN.

## ADAPTABLE...FLEXIBLE

### FULLER-KINYON and F-H AIRSLIDE<sup>®</sup> CONVEYING SYSTEM

Conveying of dry pulverized materials in bulk, by air, is the efficient, economical, modern way. Materials such as talc, clays, Portland cement, pulverized coal, fly ash, limestone dust, Fuller's earth, catalysts, can be handled.

Adaptability and flexibility are important features of the Fuller-Kinyon and Airlide Systems. The plant illustrated originally comprised four concrete storage silos, served by a Fuller-Kinyon Portable Pump, operated on a track underneath the silos, for conveying talc to packer bin and bulk-car loading. Later, storage was increased by the addition of five flat-bottom steel bins adjacent to the concrete silos. For economical conveying from these bins, F-H Airlides were installed, to convey to the F-K Portable Pump. Later, for more advantageous packing and loading, the packer bin was moved to a new location. These additions and changes required no major alteration to the Fuller-Kinyon system, merely the extending of the conveying pipe line to the new packing plant location.

Fuller Company is the exclusive manufacturer of air gravity conveyors, except for use in motor vehicles, under Huron Portland Cement Company U. S. Patent Nos. 2,316,814, 2,517,837, 2,527,394, 2,527,455, 2,527,466, 2,527,488 and Patents Pending.

Pneumatic conveying systems can be installed without interfering with existing structures or equipment, without interrupting production. May we suggest that you have us make a study of your conveying problems. Our findings and recommendations may give you an entirely new concept of conveying.

# Fuller

FULLER COMPANY,  
Catasaugus, Pennsylvania  
Chicago 3—120 So. LaSalle St.  
San Francisco 4—420 Chancery Bldg.

DRY MATERIAL CONVEYING SYSTEMS  
AND COOLERS • COMPRESSORS AND VACUUM PUMPS  
FEEDERS AND ASSOCIATED EQUIPMENT

G-76



# WIRE ROPE

***This is the most  
economical rope  
we've ever made  
for quarries***

ROEBLING is the best known name in wire rope. That's partly because we were the first wire rope maker in America. But more than that, we've always led in developing better wire and better rope for every purpose.

Today's Roebling Preformed "Blue Center" Steel Wire Rope is the quarryman's best choice for efficiency and long life. This rope has *extra* resistance to crushing and abrasion . . . stands up under rough going. It saves you time and cuts costs.

There's a Roebling wire rope of the right specification for top service on any job. Call on your Roebling Field Man for his recommendations. John A. Roebling's Sons Company, Trenton 2, New Jersey.



# ROEBLING

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• DENVER, 4801 JACKSON ST • DETROIT, 915 FISHER  
BLVD • HOUSTON, 6216 NAVIGATION BLVD • LOS  
ANGELES, 5340 E. HARBOR ST • NEW YORK,  
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1ST AVE S. • TULSA, 321 N.  
CHEYENNE ST • EXPORT SALES  
OFFICE, TRENTON 2, N. J.



# When you can't afford "down time" **that Pioneer Edge**

## **Texas producer has record of only 2 days "down time" in 5 years**

● You can't make money with idle equipment... especially with a big crew of men standing by while you shut down to replace a classifier or repair faulty gears or bearings.

You can understand, then, why Fort Worth Sand & Gravel Co. is so enthusiastic about PIONEER equipment. Shown here is their Thomas Plant, located near Richland Hills, Texas. Since its erection five years ago, this PIONEER Washing Plant has been cleaning sand and gravel at an average rate of 70 yards an hour, 10 hours a day, 6 days a week, the year around. During the entire year of 1949, for instance, re-

pairs took just 45 minutes. Over the 5 year period, only 2 days have been lost due to breakdown.

When we asked Howard Rowland, the foreman, how long a conveyor belt lasted on the job, he replied, "I don't know... I've never needed a new one."

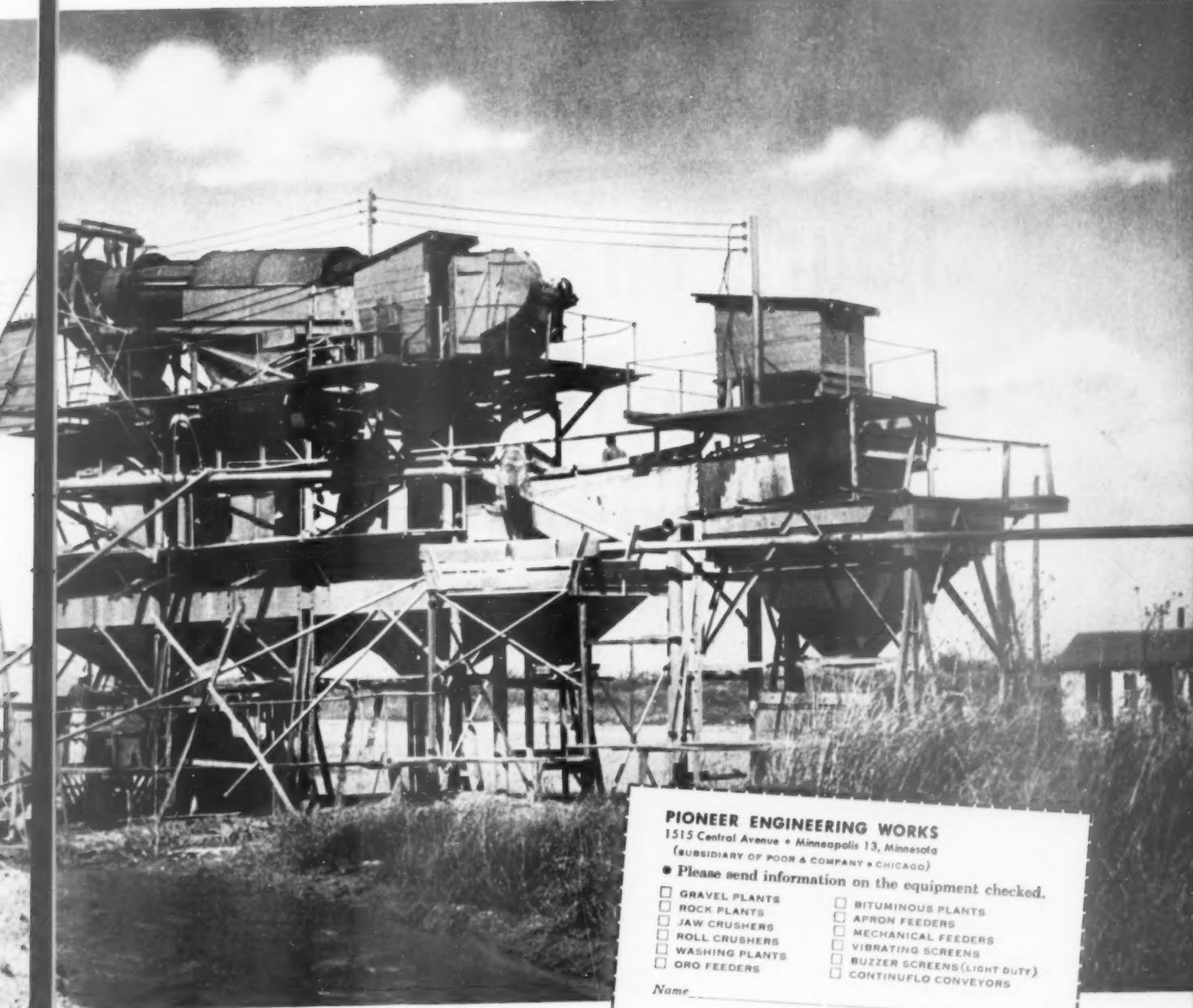
Unusual? Not at all. PIONEER plants are noted for extra ruggedness and long life. This is just another example of how that famous PIONEER EDGE is enabling so many shrewd contractors, aggregates producers and other PIONEER users to cut production costs.



# **Pioneer**

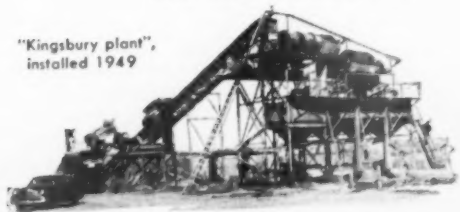
*Continuoflo* **EQUIPMENT**

# keeps your plant going



Two more **Pioneer Plants**  
guarantee Fort Worth Sand & Gravel Company  
low cost production.

"Kingsbury plant",  
installed 1949



"Britain plant",  
installed 1950



## PIONEER ENGINEERING WORKS

1515 Central Avenue • Minneapolis 13, Minnesota  
(SUBSIDIARY OF POOR & COMPANY • CHICAGO)

• Please send information on the equipment checked.

- |   |  |
|---|--|
| <input type="checkbox"/> GRAVEL PLANTS  | <input type="checkbox"/> BITUMINOUS PLANTS           |
| <input type="checkbox"/> ROCK PLANTS    | <input type="checkbox"/> APRON FEEDERS               |
| <input type="checkbox"/> JAW CRUSHERS   | <input type="checkbox"/> MECHANICAL FEEDERS          |
| <input type="checkbox"/> ROLL CRUSHERS  | <input type="checkbox"/> VIBRATING SCREENS           |
| <input type="checkbox"/> WASHING PLANTS | <input type="checkbox"/> BUZZER SCREENS (LIGHT DUTY) |
| <input type="checkbox"/> ORO FEEDERS    | <input type="checkbox"/> CONTINUFLU CONVEYORS        |

Name \_\_\_\_\_

Company \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_

Zone \_\_\_\_\_ State \_\_\_\_\_

**52 bank yds.  
of loose sand  
hourly on  
1100' haul!**

**FOR 7-YD. TOURNAPULL**





**W**HITE Construction Company of Kinston, North Carolina, produces approximately 1200 to 1500 tons of asphalt daily at their Greenville plant. Sand is brought from nearby pits to plant, then stockpiled for future use.

### 50% more output than 2 crawlers

Until recently, yardage was handled by two 91 h.p. crawlers and scrapers. Track costs in the abrasive material were excessive and production so low that Company President A. J. White decided to try a 122 h.p. 7-yd. D Tournapull. On a demonstration over short 900' cycles, the 1 rubber-tired "D" outproduced the 2 crawlers, combined, by over 50%! All 3 rigs self-loaded about 5 cubic yards per load... but the Tournapull completed a round trip every 3 minutes, while the crawlers required 10. The Tournapull got the job!

### Makes 10 trips hourly

Today, working longer 2200' cycles, the "D" averages a load every  $4\frac{3}{4}$  to 5 minutes. Cycle time includes 40 to 45 seconds to self-load 5 to  $5\frac{1}{2}$  bank yards of dry sand and 10 seconds to dump. Production averages 52 bank yards per 50-minute hour.

### Eliminates track maintenance

In addition to boosting output over 50%, the "D", which costs less than  $\frac{1}{2}$  of the 2 crawler-scraper rigs, has eliminated all crawler track maintenance. Because its 4 tires replace approximately 500 wearing parts in the comparative track assembly, parts inventory is greatly reduced... lubrication and repair expense cut. "The Tournapull is hauling sand to our plant cheaper than any other scraper we have ever had," says White.

### Other contractors agree

White's experience and comments are not exceptional either. Here's what other contractors say:

Finley P. Smith, using Tournapulls to build a 138,000-yd. railroad grade separation near Ft. Pierce, Fla. . . . "D's are the only equipment I've seen that will haul ball-bearing ocean sand economically."

J. C. Wesley, Superintendent on H. E. Wolfe Construction Company's 325,000-yd. highway job between Orlando and Clermont, Fla. . . . "Our 3 Tournapulls move more yards of sand per day than any machines I've seen of their size."

G. J. Ham, using both crawlers and Tournapulls to level 100,000 yds. of pure blow sand at Grand Rapids, Michigan. . . . "Tournapulls go loaded where crawler equipment won't go empty... move dirt faster and cheaper per yard than any equipment we've ever owned."

If you are working in sand, it will pay you, too, to switch to Tournapulls. Your LeTourneau Distributor will be glad to help you estimate the production you can get with these rigs. Ask him for performance reports on work similar to yours.

**R. G. LeTOURNEAU, INC.**  
Peoria, Illinois



With low-pressure wide-base 65" sand tires on both drive wheels, Tournapull has ample traction and rotation to pull through this dry sand. Power-proportioning differential also helps by automatically allocating up to 4 times the power to drive wheel on best footing.



# Every Air Hose With This Trademark

## Assures Long Operating Life

Air hose economy is not measured in feet per dollar. The only true yardstick of air hose value is *service hours*.

Because every BWH hose has been developed,



tested and field-proven to give the best possible combination of strength, safety, flexibility and damage resistance . . . you get *maximum service life*.

Whatever brand of hose you are now buying, you are paying for BWH benefits — so why not start getting them—*now*?

Today, contact your nearby BWH Distributor.

### CONCORD AIR



An extra quality, exceptionally rugged hose for toughest use on air drill and pneumatic service in mines, quarries and construction jobs. Non-porous tube resists heat and oil. High tensile cotton yarn braid reinforce carcass. Tough grey cover resists cutting, gouging, abrasion. Made in  $\frac{1}{4}$ " 2-braid and  $\frac{3}{4}$ " 2-braid sizes. 200 to 300 lbs. working pressure. Maximum length 50'.

### BAY STATE AIR DRILL



For heavy construction work in mines, quarries, tunnels and wherever large size hose is required for long service. Smooth black tube resists heat and oil. Carcass of strong, rubber-impregnated multiple ply woven duck. Rugged, heavy-gauge red rubber cover resists severe weather extremes, cutting, abrasion. 9 sizes stocked from  $\frac{1}{2}$ " to 4". Working pressures from 175 to 225 lbs. Maximum length 50'.

### AUROCHS AIR



For portable air compressors, jackhammers, rugged industrial and construction work. Smooth, black, non-porous tube resists heat and oil. Carcass: multiple ply, rubber-impregnated, rugged woven fabric. Tough black cover resists weather and abrasion. Stocked sizes:  $\frac{1}{4}$ ",  $\frac{3}{4}$ ", 1". 200 lbs. working pressure. Maximum length 50'.

### VIM AIR



For general industrial use, on compressors and pneumatic tools. Black tube resists oil and heat. Husky cotton yarn braids. Smooth, red cover resists weather, abrasion. 8 sizes stocked,  $\frac{1}{4}$ " 2-braid to 1" 3-braid. Working pressures 150 to 225 lbs. Maximum length 500'.

### BULL DOG VARI-PURPOSE AIR



For a variety of jobs including handling of air, water, oil, gasoline, kerosene (not for paints, lacquers, lacquer-solvents). Black, synthetic tube resists oil and heat. Carcass is braided rayon cord, high strength, super flexible. Smooth, brown, tough synthetic cover resists oil, abrasion, sunlight. 11 sizes stocked from  $\frac{3}{16}$ " one-braid to 1" 2-braid. Working pressures: 200 to 300 lbs. Maximum length approximately 500'.



## BOSTON WOVEN HOSE & RUBBER COMPANY

Distributors in all Principal Cities

PLANT: CAMBRIDGE, MASS.

P. O. BOX 1071, BOSTON 3, MASS., U. S. A.

**P&H**  
**MODEL**  
**955-A**



## **P&H MAGNETORQUE\***

**is the electric swing  
that never wears out**

Just what does Magnetorque mean to you in this great 2½ yd. shovel? Simply this: It eliminates the old swing frictions with their constant headaches and replacement costs. It gives you the smoothest, slickest swing you ever saw—15% to 25% faster than any other machine of its size—and Magnetorque will last the life of your machine.

Add to this the rugged, rock-rated construction of welded high tensile steels—the

smooth hydraulic control—the greater stability and digging power—and you have the greater output which means greater profit. Better get all the facts about this outstanding machine—companion to the famous P&H 1055 (3½ yds.). Ask about the P&H 955-A today.

\*T.M. of Harnischfeger Corporation for electro-magnetic type clutch.

**HARNISCHFEGER**  
**CORPORATION**

4465 W. NATIONAL AVENUE • MILWAUKEE 46, WISCONSIN

FROM TACONITE IN THE ARCTIC CIRCLE . . .

TO DIAMONDS IN SOUTH AFRICA . . .

### "SYMONS" CONE CRUSHERS ARE ON THE JOB

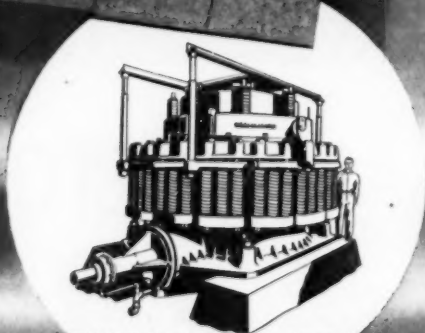
● The important role that "SYMONS" Cone Crushers play in recovering the valuable mineral resources found in the earth's surface can be traced throughout the world.

From the taconite iron ore mines of Kirkenes, Norway, far above the Arctic Circle . . . to the diamond mines of South Africa . . . you will find "SYMONS" Cones on the job.

The world-wide use and acceptance of "SYMONS" Cone Crushers by leading companies engaged in the production of ores and industrial minerals is evidence that the "SYMONS" Cone is outstanding in its performance from the standpoint of finely crushed product—great capacity and low crushing cost.

**NORDBERG MFG. CO., Milwaukee, Wisconsin**

"SYMONS" . . . A NORDBERG TRADEMARK KNOWN THROUGHOUT THE WORLD



"SYMONS" Cone Crushers . . . the machines that revolutionized crushing practice . . . are built in Standard, Short Head, and Intermediate types, with crushing heads from 22 inches to 7 feet in diameter—in capacities from 6 to 900 tons per hour.



"SYMONS"  
Primary  
Crushers



Grinding Mills



Mine Hoists

C452



"SYMONS"  
Vibrating Bar  
Grizzlies and Screens



Diesel Engines



# NORDBERG



MACHINERY FOR PROCESSING ORES and INDUSTRIAL MINERALS  
NEW YORK • SAN FRANCISCO • SPOKANE • WASHINGTON • TORONTO  
MEXICO, D. F. • LONDON • PARIS • JOHANNESBURG





## Her fingertips imagine the taste

The lady doesn't trust her eyes alone.

The buyer of Multiwalls is in much the same position.

Aside from package design, it's hard to tell one manufacturer's bag from another's simply by looking at it or fingering it.

Put the bags out of sight and you may be able to see many differences.

Men who buy 85 per cent of all Multiwalls consider\* these intangibles more important than any other factor when they choose their supplier.

Invariably, these are among the first questions they ask . . .

"Is this company big enough?"

"Do they have a fair allocation policy?"

"Are their prices competitive?"

"Do they respect delivery dates?"

In a nutshell—

"Are they good people to do business with?"

We can't tell you what the answers are when these Multiwall users consider Union. This we do know . . . and the inference is yours to make—

In these days of industrial pressure, when *dependability* is a fervent wish as well as a word, men to whom Multiwalls are important are placing an increasing share of their orders with Union.

More so every day . . .

## IT'S UNION FOR MULTIWALLS



\*August, 1951 research study.

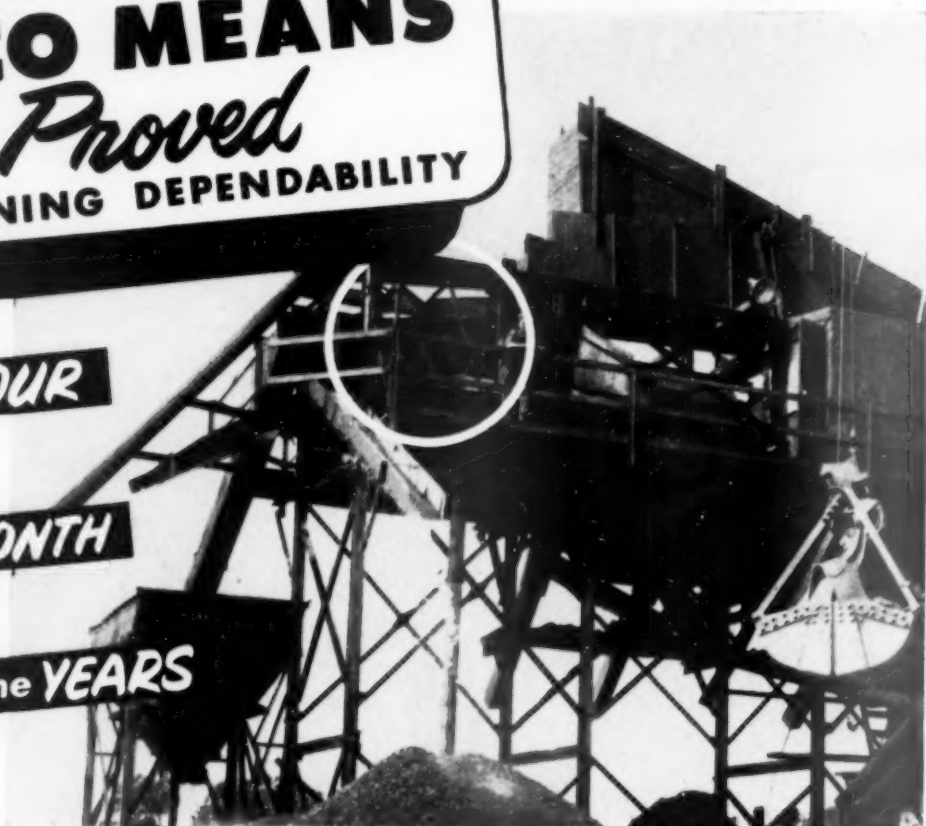
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# SECO MEANS *Proved* SCREENING DEPENDABILITY

by the **HOUR**

by the **MONTH**

through the **YEARS**



After all . . . it's performance that counts . . . it's the day after day, year after year ability to stay on the job without constant maintenance that makes any vibrating screen worth its salt.

So when we talk about Seco performance . . . we're talking from your viewpoint. Hundreds of operators like you have found out from actual experience that Seco vibrating screens are built to endure . . . under all types of load requirements.

That's it in a nutshell! 94% of all Seco screens ever built are still in service . . . Many are in their 12th, 13th, 14th, and 15th years of dependable service.

May we talk to you soon about a dependable Seco for your screening job.

## SECO

TRUE CIRCULAR ACTION

VIBRATING SCREENS

### SECO BUILDS OVER 300 "Performance Proven" MODELS

Single, double, triple and three and one-half deck types. For screening everything from ag-lime to rip-rap.

Send for complete information and the name of your nearest Seco dealer.

**SCREEN EQUIPMENT CO., INC.**  
1750 Walden Avenue, Buffalo 25, New York.

In Canada: United Steel Corp., Toronto, Ontario

# *Why* Your Best Bet for Tractor-Scraper Work is the . . .

## **BIG RED TEAM**



**Meant to Work Together** — Bucyrus-Erie B-170A and B-250 Scrapers were designed especially to work with the International TD-24 Tractor — to fully apply its great power and speed, and to assure maximum efficiency.

**Big Capacity** — Bucyrus-Erie Scrapers have it! The 16-yd. (struck) B-170A is the largest of scrapers for loading without pusher help. The B-250 (22-yd. struck) is the biggest scraper in current production.

**Best by Competitive Test** — In field tests, where loads were actually weighed and trip cycles accurately timed, the Big Red Team consistently outperformed other tractor-scraper units at a lower cost per yard.

40152C

**Big Red Team** — Bucyrus-Erie B-170A Scraper and International TD-24 Tractor — loading shale for a Louisiana aggregate plant.

Find out more about the dirt-hauling member of the BIG RED TEAM — see your International Industrial Tractor Distributor for full details on Bucyrus-Erie B-Type Scrapers.

**BUCYRUS  
ERIE**

SOUTH MILWAUKEE, WISCONSIN

# Produce Your HIGHER PROFITS SPECIFICATION SANDS

..... with **WEMCO** Sand Preparation Machines



## Here's What We Mean!

An important operator (name upon request) facing the problem of losing his market due to inability of his sand circuit to produce specification sands, called on WEMCO to help solve the problem. WEMCO found that too many fine sands were being wasted. Based on the analysis, a #48 WEMCO machine was installed—**giving these results:**

- Cost of installation paid for itself in 130 days!
- Specifications were met—capacity increased 40%!
- Sand losses on 100 mesh reduced 136 times!
- Sand losses on 200 mesh cut 21 times!
- Total sand losses cut 10 times!
- Saved **53 tons additional** sand per day!

The WEMCO Sand Preparation Machine was designed to produce specification sands **economically**. Its almost automatic operation gives sharp, accurate separations between desired sands and waste materials such as slime, clay and excessive size fractions.

These important features establish WEMCO superiority in producing clean, specification sands:

- large settling area
- wide overflow weir capacity
- high raking capacity
- sharp sizing separations
- low maintenance costs
- low horsepower
- minimum attendance requirements

## OTHER WEMCO PRODUCTS

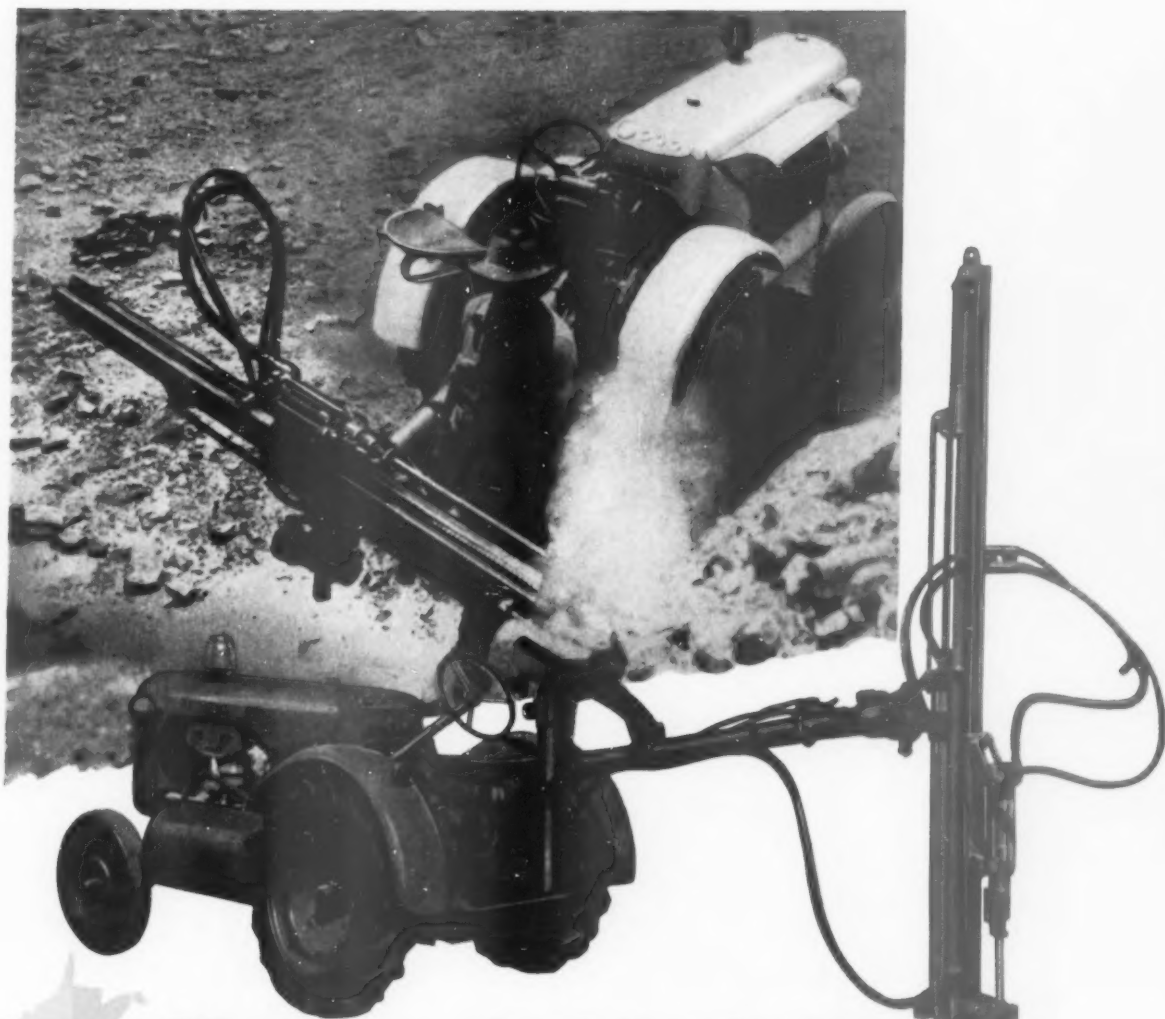
Mobil Mills • Coal Spirals • HMS Thickeners  
HMS Pumps • Denifiers • Cone Separators  
Drum Separators • Fagergren Laboratory Units  
Fagergren & Steffensen Flotation Machines  
Hydroseparators • HMS Laboratory Units  
Dewatering Spirals • Agitators • S.H. Classifiers  
Thickeners • Sand Pumps • Conditioners

## WEMCO Can Aid You!

Whatever your sand washing problem may be—loss of fines, high cost of operation, inability to meet specifications, control of size fractions—**drop WEMCO a line today**. You are under no obligation in obtaining our engineering recommendation.







**West Virginian doubles footage  
for less than half equipment cost!**

**Uses TRACTAIR  
with Mobildrill**

**Self-propelled, self-contained  
wagon drill and air compressor**



As much as 750 feet of hole daily, where only 300 feet were drilled before! More than double the production of three hand-held sinkers and a 315-cfm compressor! Substantial savings on both fuel and equipment costs! That's the remarkable record a Le Roi Tractair with Mobildrill set for one user in West Virginia.

Tractair with Mobildrill is a light-weight Le Roi-CLEVELAND wagon-drill unit mounted on Tractair — a combination 35-hp tractor and 105-cfm compressor.

One man can drive the Tractair with Mobildrill — and go places he couldn't get to if he had to tow separate compressor and wagon drill. He can sink vertical or drill horizontal holes at any angle up to 12' high. Swinging boom

permits him to drill 4-6 holes of a pattern from one spot.

See for yourself how a Tractair with Mobildrill meets your requirements for fast, flexible drilling. Make arrangements with your nearby Le Roi distributor to watch a Tractair with Mobildrill at work. Also investigate the complete line of Le Roi-CLEVELAND rock drills — hand-held machines from 19 to 80 lbs., light and heavy wagon drills, the exclusive T-286 Dual Drill Rig, and a complete line of portable air compressors.

**LE ROI COMPANY**



MILWAUKEE 14, WISCONSIN  
Plants: Milwaukee • Cleveland • Greenwich, O

SEND COUPON BELOW FOR FREE BULLETIN

**Tear out coupon and mail today!**

LE ROI COMPANY, Dept. RP-5  
1706 S. 68th Street, Milwaukee 14, Wisconsin

Send me bulletins that describe Tractair with Mobildrill  
and T-286 Self-Propelled Dual Drill Rig.

Name.....Title.....

Company.....

Company Address.....

City.....(.....) State.....

\* 22

# TELSMITH



**NEW Tyrone Rock Products Co. plant  
PRODUCES 3000 TONS A DAY  
at low cost...with TELSMITH  
Conveying and Screening Equipment**

## **TELSMITH Equipment in this Plant**

- One (1) 5' x 12' Pulsator Single Deck Scalping Screen
- One (1) 5' x 12' Pulsator Double Deck Scalping Screen
- One (1) 4' x 10' Pulsator Double Deck Rinsing Screen
- Eight (8) 5' x 12' Vibro-King Single Deck Finishing Screens
- Two (2) 4' x 10' Vibro-King Single Deck Finishing Screens
- Twelve (12) Telsmith-BG Conveyors 18" to 42" wide, 42' to 200' long
- Fifteen (15) 16" x 18" Bin Gates Boquad Tunnel Type

● To serve the rapidly growing Atlanta market, this modern plant at Tyrone, Ga., is a remarkably efficient, low-cost operation. Designed and engineered by Telsmith, its average capacity is about 300 tons per hour with peaks of 450 tons. Highly efficient screening is supplied by 13 Telsmith vibrating screens making 8 sizes of crushed granite (-2" to -8 mesh) for railroad ballast, and concrete and asphalt construction.

Finished sizes are stockpiled over a reclaiming tunnel, then rinsed and delivered to bins for loading cars and trucks. Telsmith did all engineering, including detailed drawings, furnished all screens and conveyors and carefully co-ordinated all equipment for smooth, efficient operation. To relieve yourself of technical details and to be sure of satisfactory results, consult Telsmith without obligation. Send for Bulletin 266.

**SMITH ENGINEERING WORKS**  
508 EAST CAPITOL DRIVE, MILWAUKEE 12, WISCONSIN

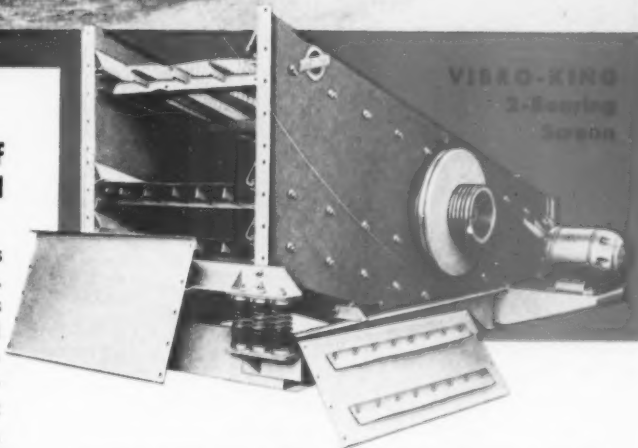
# ENGINEERED



## VIBRO-KING

### For Finished Screening of Medium and Small Sized Aggregate

With its two bearings, the Vibro-King is simpler, more efficient, and upkeep is lower. Tel-smith-patented automatic counter-weights assure smooth starting and stopping as well as exceptionally smooth operation. Its circular screening movement is uniform everywhere on the screen cloth, and is constant under any load. Entire vibrating mechanism, including vibrating unit and screen cloth, floats on nests of springs. Welded and reinforced main frame is horizontal for rigidity and easy installation. Cable suspension, if desired. Five sizes, 1, 2, or 3 decks.



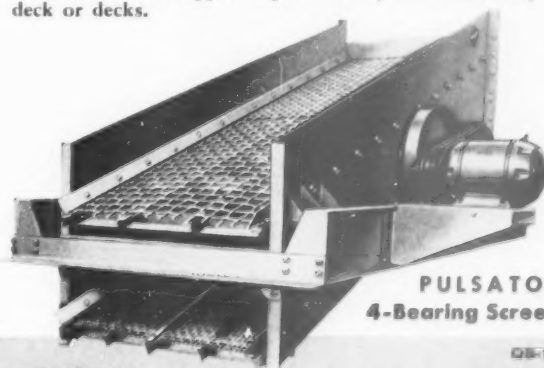
**Changing Screen Cloth is Simple and Quick**—The upper end of the Vibro-King is readily removable, making it a much easier job to change screen cloth and saving a great deal of time.

**Screen Cloth Mounting**—At customer's option—screen cloth may be mounted in rubber on steel screen trays; or stretched over steel screen supports—protected by rubber—on any deck or decks.

## PULSATOR

### For Heavy-Duty Scalping

A four-bearing, heavy-duty vibrator... for all kinds of screening, especially scalping, or large sized aggregate... Pulsator's circular movement gives uniform, efficient screening on all decks and under heaviest loads. The best alloy steels, the finest anti-friction bearings, protected by both labyrinth and piston ring seals, give longer life and lower upkeep. Eleven sizes, with 1, 2, or 3 decks.



**PULSATOR  
4-Bearing Screen**

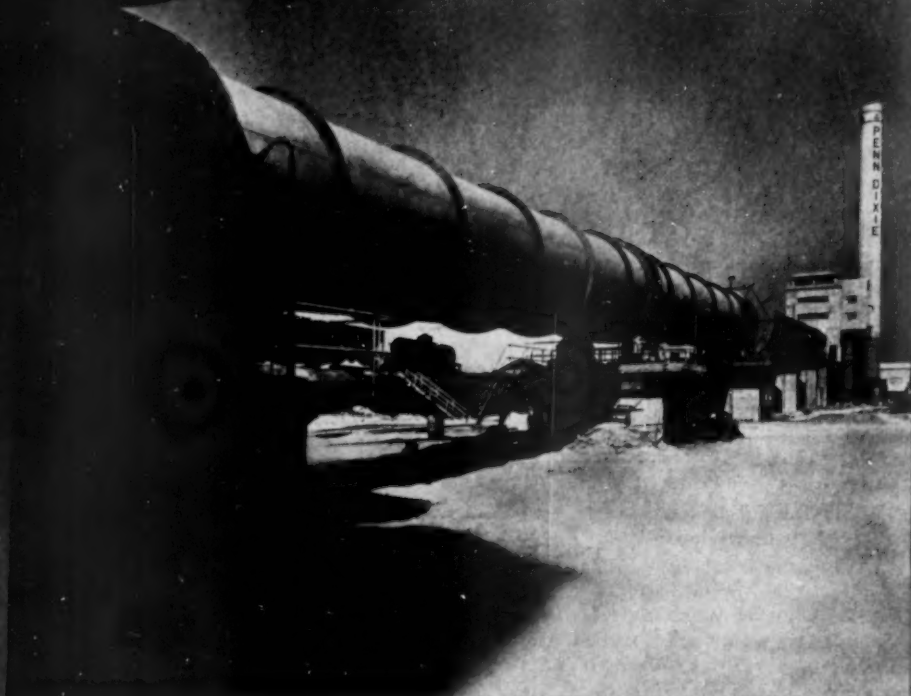
Q5-12

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Clyde Equipment Co., Portland 9, Ore., & Seattle 4, Wash. • Mines Eng. & Eqp. Co., San Francisco 4, Calif. • Interstate Equipment Co., Statesville, N. C. • Bish Eqp. Co., Charleston 22, & Clarksburg, W. Va. — Roanoke 7, & Richmond 10, Va. • Wilson-Woerner-Wilkinson Co., Knoxville 9, & Nashville 6, Tenn.



# SMIDTH

## ROTARY KILNS



**Longest Rotary Kiln in the Western Hemisphere.  
500 feet long, 12 feet in diameter.**

**Designed and Furnished by F. L. Smidth & Co.  
for Penn-Dixie at Kingsport, Tenn.**

***For Smidth Machinery apply to:***

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42 Queen's Road  
Bombay, India



# "WE HEAR..."

May, 1952

A glass fiber company has developed quartz, by a chemical process, in the form of fibers from which a "quartz paper" has been made. Initial use of the new paper will be as a high-temperature electrical insulating material. At present, the glass fibers used in making the paper are available to paper manufacturers in small laboratory quantities only.

\*\*\*\*\*

A Painesville, Ohio, engineer is using "concrete doughnuts" to stop lake shore erosion and to build up sandy beaches along the Erie lake front. A patent for the process is pending. The "doughnuts," 2 ft. high x 6 ft. in dia., weigh 2700 lb. each and are set flat, with tops either slightly above or even with the water. A buoying device floats them into position. The chief of the State Department of Natural Resources' Beach Erosion Division stated that the method sounds interesting and promising. The state owns about 80 percent of the 184 miles of land being eaten away by Lake Erie. The inventor of the process claims the "doughnuts" cost considerably less than other types of erosion control construction and is arranging contracts with lake-front property owners.

\*\*\*\*\*

A large deposit of phosphate rock has been discovered in Venezuela, as reported by the Department of Commerce. If the deposits can be excavated economically, it will be of considerable importance to the country as most Venezuelan soils are deficient in phosphate.

\*\*\*\*\*

According to Missouri Pacific Lines, since World War II, when the railroads carried more than 90 percent of all military freight and 97 percent of all organized military travel, they have spent an average of more than a billion dollars a year to expand and improve their facilities and service. It was also stated (which may be open to question) that a recent national survey showed that 63 percent of the American people believe railroads are more important to the defense effort than any other form of transportation.

\*\*\*\*\*

A midwestern gravel company was recently sued for \$50,000 by a worker who sustained injuries while welding a pipe for the company. The plaintiff alleged that his earning capacity had been permanently reduced, due to the shock and two fractured toes he received when a higher weld came loose, causing the pipe to fall on his foot. He charged the company with negligence in permitting an unqualified person to make the previous weld.

\*\*\*\*\*

Pratt County, Kan., commissioners recently purchased a sand pump to be used in obtaining sand from a local lake for use on county roads—just another instance of government competition with private enterprise.

\*\*\*\*\*

A new organization, the Midwest Authorized Truckers Association of Illinois, was recently formed to represent trucking interests in an allied attack against the new Illinois truck rates. The new rates, devised by the state legislature to aid the road building program, were upheld recently by the State Supreme Court, nullifying a prior decision of the Sangamon County Circuit Court which had held the new fees confiscatory. The new truckers' association now plans to take the case to the United States Supreme Court.

## WE HEAR

Now that spring is here and many people are turning their attention to gardening, just a word of caution—keep bags of cement out of reach of children. According to a recent newspaper item, a family in the West lost its garden when the children, in their eagerness to have a productive vegetable garden, mistakenly used cement instead of fertilizer. Cement has many attributes, but we doubt its merits as a fertilizer!

\*\*\*\*\*

The chairman of the Ohio Turnpike Commission recently announced that a bond issue of approximately \$265,000,000 is expected to be on the market sometime in May, for the financing of the 181-mile original link of the proposed toll road. Construction on the turnpike is scheduled to begin in October, with 80 percent completion scheduled by the end of 1953. Steel allotments for the last quarter of this year total approximately 25,000 tons, with a balance of 125,000 tons to be allotted as needed during the progress of the work. Reinforcing steel is to be used wherever possible, with structural steel, in much shorter supply, to be used only where necessary.

\*\*\*\*\*

A recent report in Chemical Engineering states that, according to a chemist at the University of California, soils too high in alkali may be economically reclaimed with the use of sulfuric acid. Soils thus treated three years ago are said to be still highly productive.

\*\*\*\*\*

A report from Washington, D.C., indicated a uranium deposit had been discovered in Warren County, N.J. However, a state geologist doubts that it has any commercial value or that it will do much towards increasing the U.S. stockpile. The geologist stated that although radioactive minerals in certain of the very old crystalline rocks had been found, they were not necessarily uranium. Other radioactive minerals, such as allanite, have been seen, but are not sources of uranium. Allanite, he said, had no commercial use at all—merely a "mineral curiosity."

\*\*\*\*\*

Two truckers for an Ohio stone quarry were recently fined for exceeding the weight limit of 7 tons on straight trucks and 9 tons on tandem trucks, enforced for certain highways in the county. Each defendant was fined \$25, plus \$1 per hundred pounds of overload, and \$8.06 apiece for court costs, making a total fine of \$134.12. One of the defendants stated that under present regulations, stone haulers would lose money, but the law-enforcing officers indicated they would continue making arrests as long as there were violations, and further indicated that under certain weather conditions, the weight limit might be lowered to 5 tons. It was suggested that either the stone haulers raise prices or go out of business.

\*\*\*\*\*

The theft of reduction gears valued at \$1500 was reported by a midwestern sand and gravel company. Some of the gears, broken up for junk, were later found in a local junk yard. It appears the nation-wide scrap drive may be taken a little too literally by some enterprising persons, who do not care how or where they obtain the "scrap." We fear patriotism wasn't the motive, however.

\*\*\*\*\*

An improvement in the safety tube and up to 42 percent more mileage are claims for a new tire recently developed by Goodyear Tire & Rubber Co. The tire, incorporating a new all-nylon cord, with sidewalls of natural rubber and a tread of cold synthetic, is also said to provide 26 percent more non-skid tread thickness than former tires. The higher mileage performance is credited to a better arrangement of the design and contour of the tire, plus research and development of the synthetic. The improved safety tube is said to provide protection against punctures as well as blowouts.

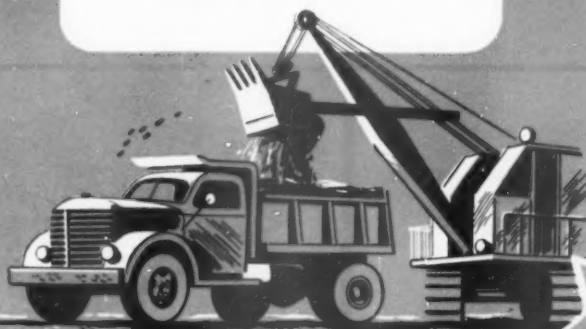
\*\*\*\*\*

The construction of a \$12,000,000 sewage disposal system at Charleston, W. Va., is expected to get under way this summer. Construction will include a \$10,000,000 disposal plant, with the remaining \$2,000,000 to be used for additions to the present city drainage system, tying in outlying areas that have been without sewer facilities.

THE EDITORS

# LUBRICATION and MAINTENANCE GUIDE

for  
**CONTRACTORS'**  
and Allied  
**EQUIPMENT**



**GULF**

4th  
Edition

96 pages of up-to-date information in handy pocket size!

JUST OFF THE PRESS, the new revised edition of this popular Guide is chock-full of the latest facts on how to properly lubricate and maintain your equipment.

As its title implies, this informative book covers the lubrication and maintenance of equipment of quarries, crushed stone plants, sand and gravel plants, asphalt plants, and

ready-mixed concrete suppliers, in addition to contractors' equipment.

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# Pre-testing in Lab **ELIMINATES** **GUESSWORK** for Projected Process

## **PROBLEM . . .**

A mining company wanted to know if lightweight aggregate could be produced profitably from material available in a company-owned shale deposit.

"Can a product be made that will meet commercial aggregate specifications?" And — "Will the process be commercially practical?" The customer wanted answers to these questions before going ahead with full-scale operations.



## **WHAT WAS DONE . . .**

A sample from the shale deposit was sent to the Allis-Chalmers Process Research Laboratory. Tests in the Laboratory's 15-ft rotary kiln and gyratory crusher indicated that the product would meet the highest aggregate standards . . . and that the process would yield a healthy margin of profit.



## **RESULT . . .**

This company was able to set up operations on a commercial scale with the assurance that the product would be readily salable . . . and with a complete knowledge of the costs involved.



A-3675

**ALLIS-CHALMERS**  
**Research**  
**Laboratories**

**PILOT PLANT FACILITIES  
ARE AVAILABLE FOR  
YOUR USE IN . . .**

Grinding  
Crushing  
Concentration  
Food, Chemical and  
Grain Processing  
Oil Extraction  
Pyro-Processing

The Laboratory's complete facilities for chemical and physical analysis have also been used profitably by hundreds of clients. All testing services include the technological skill of the Laboratory's personnel, who are guided by Allis-Chalmers invaluable experience in engineering equipment for industry.

Testing is done on a confidential basis. Charges are based on costs. Estimates for test work can be obtained from the A-C representative in your area or by writing Allis-Chalmers Research Laboratories, Milwaukee 1, Wis.

# **ALLIS-CHALMERS**



Send for  
Laboratory  
Bulletin  
07B6119B.





## "Our Dodge trucks stay on the job"

... says **R. V. Venable**, Quarry Owner, Elberton, Ga.

"Our first Dodge is still on the job after eleven years," says Mr. Venable. "And in all that time, the rear end and transmission have been overhauled *only once*."

"We've tried other trucks, but they just couldn't stand the gaff. With Dodge, our trucks' cost of operation and maintenance has been at a minimum."

"What really counts is that our Dodge trucks stay on the job—both out of the pit and on delivery. That's why *every* truck we own today is a Dodge 'Job-Rated' truck!"

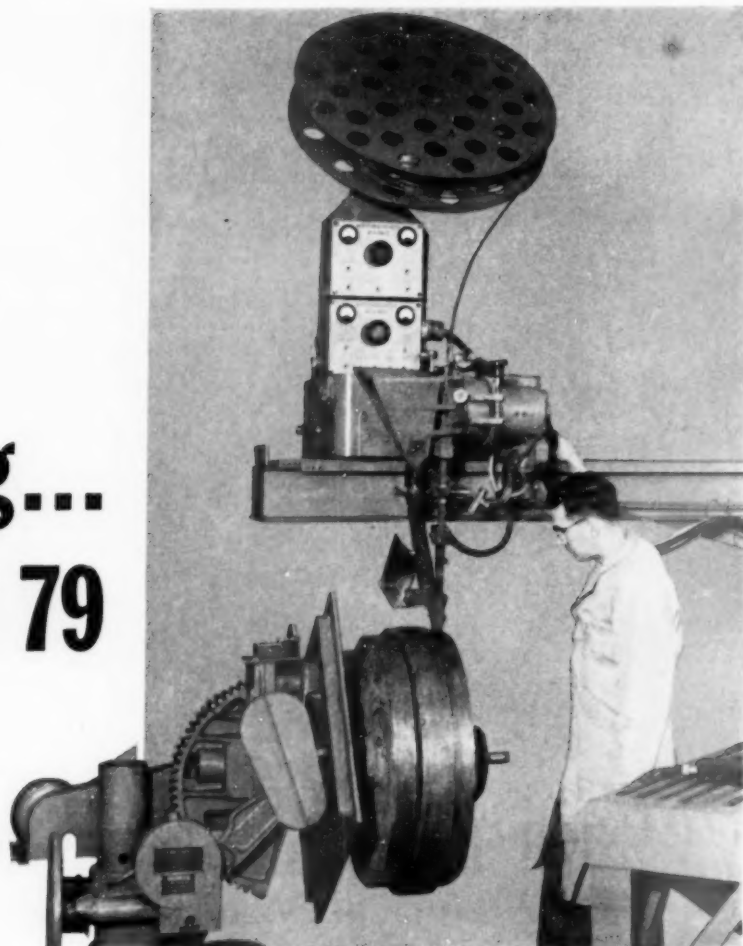
You'll find hauling men everywhere in ready agreement with Mr. Venable. And why not? They know that Dodge trucks are factory-engineered to fit the job . . . to save money and last longer.

Consider a high-tonnage Dodge, for instance. Its husky, high-compression power plant gives you power to spare on toughest jobs. You get top economy from proved dependability features like chrome-plated top piston rings and intake and exhaust valve seat inserts—plus twin carburetion and exhaust system. And because of better weight distribution you can haul bigger payloads without overloading.

Of course, this is only part of the story on the extra power, economy, and dependability of Dodge "Job-Rated" trucks. There's a neighborly fellow near you who'll be happy to help you with your hauling needs. He's that friendly Dodge dealer who specializes in the right truck for the job. And he's willing to talk things over with you any time you like.

# DODGE "Job-Rated" TRUCKS

# Announcing... Amsco AW 79



## for AUTOMATIC HARDFACING

AMSCO AW 79 will meet your every requirement for better control of wear where abrasion and high impact are important factors—plus giving you all the advantages of automatic welding. It can be used for reclaiming parts worn to uselessness or for increasing productivity of new parts.

The result of extensive research and field testing, AMSCO AW 79 is especially suitable for rebuilding and hardfacing tractor rollers and idlers. Back-up rolls, steel wheels, sheeting rolls, dredge pins, as well as dozens of other applications, can be successfully hardfaced with AW 79. It can be used on any conventional automatic submerged arc

welding equipment now being used.

AW 79, the first in a series of rods by AMSCO for automatic hardfacing, is an alloy steel electrode fabricated by encasing particles of alloy metals in a continuous steel tube. Deposits are of martensitic alloy steel with chromium and molybdenum as the principal alloying agents. It is available in coils weighing approximately 100 lbs., each with an inside coil diameter of 22½", and is stocked in wire diameters of ⅝" and ¾". Packed in cardboard containers with an anti-rust agent, other coil diameters and sizes are available on request. Write today for complete information.

AMERICAN

**Brake Shoe**

COMPANY

**AMERICAN MANGANESE STEEL DIVISION**

377 EAST 14th STREET • CHICAGO HEIGHTS, ILL.

Other plants: New Castle, Del., Denver, Oakland, Cal., Los Angeles, St. Louis. In Canada: Joliette Steel Division, Joliette, Que.  
Amsco Welding Products distributed in Canada by Canadian Liquid Air Co., Ltd.

# PROGRESS IN EXPLOSIVES...



## WHICH BEAKER HAD THE BANG?



The small beaker (left) contains ammonium nitrate. This is an important explosives ingredient, but it absorbs moisture readily. Notice in the large beaker (left)—how it dissolves immediately in water.

The small beaker (right) contains *Hercules* ammonium nitrate treated with a special resin. In the large beaker (right) note how the resin-treated ammonium nitrate repels water without affecting explosives' properties.

Here is a simple example of Hercules' pioneering that gives you better blasting efficiency under adverse storage and climatic conditions both in manufacture and in field use.

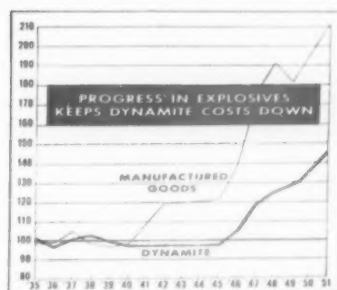


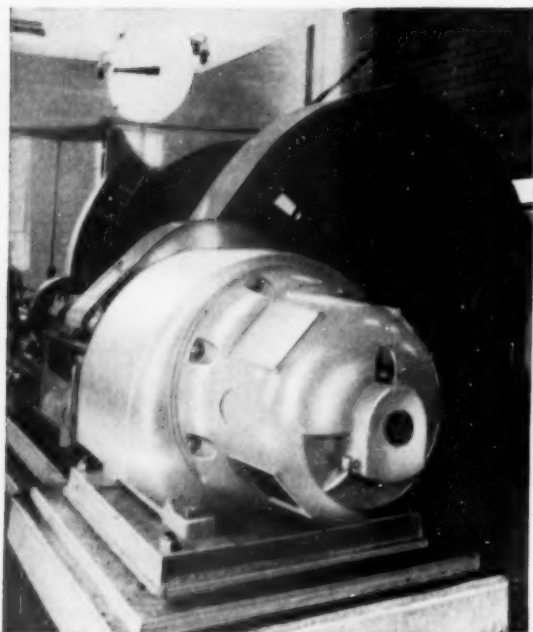
Chart shows relative stability of dynamite prices since 1935, as compared with prices of other manufactured goods. 1935-39 values=100.

**HERCULES POWDER COMPANY**

INCORPORATED

Explosives Department, 946 King St., Wilmington 99, Del.

XR52-4



**RELIABLE, EFFICIENT HAULAGE** is provided by slope hoists such as this one, powered by a G-E wound-rotor induction motor, when rock must move up a steep grade from the quarry floor.

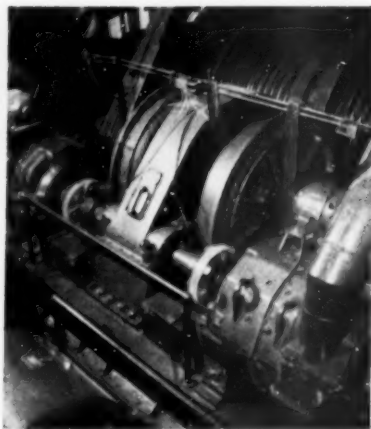


**MORE TONS PER HOUR** can be moved at lower cost per ton with G-E diesel-electric locomotives like this 65-ton switching unit. Trucks shuttle between quarry face and permanent railroad which runs to primary crushers. Flow of rock is thus maintained.

# MOVE MORE ROCK



**RUGGED QUARRYING** is done by this 3 cu yd electric shovel, powered by G-E MD-600 motors which keep it loading "high-lime" rock to feed primary crusher.



**TOUGHEST G-E MOTOR BUILT** is the MD-600, made for heavy shovel duty. Hinged top cover permits easy maintenance—right on the shovel—without disturbing motor alignment.



**MAXIMUM FLEXIBILITY** of power supply is provided by G-E portable, cable-skid switch houses. Advancing with operating equipment, they assure better voltage at quarry face.

**Modern rock haulage** is one of the six ways to increase your cement plant's output described in a new 12-page illustrated booklet prepared by G.E. A quick guide to electrical modernization opportunities, it offers many ideas on making more cement of controlled quality at lower cost per barrel. Write now for Bulletin GEA-5748.







**A CONTINUOUS, HIGH-SPEED FLOW** of crushed rock moves along this 30-inch conveyor which is driven by G-E motors. Material from primary crusher is rapidly carried to the cement plant a third of a mile away.

Hazardous rock pile-ups have been eliminated by installing interlocking G-E control to provide for sequenced operation.

# AT LESS COST

**Electrical modernization of your hoists and shovels, conveyors and haulage, can step up production schedules—boost cement output!**

Your plant can increase cement production to new highs when rock is moved efficiently from quarry to primary crusher to mill. Modernization of this first important step in the cement-making process pays big dividends in greater output.

## **ROCK-HANDLING EFFICIENCY INCREASED!**

You can keep raw materials moving on schedule when shovels and conveyors, slope hoists and locomotives are powered by reliable General Electric drives. Close co-operation with builders of materials-handling equipment, plus skilled application engineering, has enabled G.E. to develop efficient, economical drives for every type of material handling service—including yours.

## **ORDERING SIMPLIFIED—TIME SAVED!**

Whatever departments you plan to modernize, your electrical requirements can be handled through G-E project co-ordination. Under this plan, G.E. selects, manufactures and delivers on a carefully co-ordinated basis all the electric equipment you need, whether ordered directly or through your contractors or equipment suppliers. You simplify ordering, save time, forgo unnecessary details.

Insisting on G-E drives pays off in satisfaction and in improved service at lower upkeep cost. Ask your G-E apparatus representative for specific details. *General Electric Company, Schenectady 5, N. Y.* 658-B

**ENGINEERED ELECTRIC SYSTEMS FOR THE ROCK PRODUCTS INDUSTRY**

**GENERAL**  **ELECTRIC**

only Allis-Chalmers offers you

History-  
Making

# Tracto-Shovel

Thousands of Allis-Chalmers HD-5G 1-yd. front-end shovels are making history . . . handling an endless variety of excavating and material handling jobs faster, at lower cost than ever before.

Now . . . to meet the challenge of ever-increasing production demands, Allis-Chalmers *multiplies the scope of tractor usefulness even more*. And here's how.

The same basic design — the same versatility that made the HD-5G so useful can now be yours in 2-yd., 3-yd., and 4-yd. Tracto-Shovels. Combined with the unmatched performance of the new Allis-Chalmers tractors, they give you a real competitive advantage by bringing you a new, faster and better way of getting the job done.

## A NEW ERA OF TRACTOR USEFULNESS

**Pioneering New Methods** — Tracto-Shovels are blazing new trails in excavating and material handling . . . doing traditional jobs in a new, better way.

**A Size for Every Job** — Faster, more efficient operation; at lower equipment investment.

**All-'Round Versatility** — Not limited to a specific type of operation. Quickly interchangeable attachments adapt Tracto-Shovels to different assignments *in minutes*. Simple truck or trailer transportation between jobs.

**Built to Take It** — These new Tracto-Shovels are the toughest, strongest ever built. Every part has ample size and strength to do its job.

14 different  
attachments

Standard buckets, heavy-duty rock buckets, rock forks, bulldozer blades, light materials buckets (up to 7 cu. yd.) . . . plus other attachments for some models.

**1 yd. HD-5G**

40 Drawbar hp.  
Dumping height (bucket hinge pin): 9 ft., 1/4 in.  
Total weight: 16,200 lb.

**2 yd. HD-9G**

72 Drawbar hp.  
Dumping height (bucket hinge pin): 11 ft., 4 in.  
Total weight: 29,900 lb.

**3 yd. HD-15G**

109 Drawbar hp.  
Dumping height (bucket hinge pin): 12 ft., 8 in.  
Total weight: 40,000 lb.

**4 yd. HD-20G**

Hydraulic torque converter drive  
175 net engine hp.  
Dumping height (bucket hinge pin): 13 ft., 5 in.  
Total weight: 61,600 lb.

# Advantages

*NOW IN 3 NEW, BIGGER SIZES!* \*



**World's Largest  
Front-End Shovel**

— handles toughest  
excavating and ma-  
terials handling jobs  
in a new, faster, bet-  
ter way. Standard  
bucket capacity —  
4 yd.; light materials  
capacity — 7 yd.

*the newest, finest line on Earth!*

**ALLIS-CHALMERS**  
TRACTOR DIVISION • MILWAUKEE 1, U. S. A.



**Rex® Combination-Durobar® Chain** is an ideal chain for many single strand bucket elevator applications. Eccentric barrel feature eliminates much of the grinding action between leading barrel and sprocket tooth . . . adds to life of both chain and sprockets.



**Rex Ley Bushed Chain** is designed for elevator service under very abrasive conditions. Pins are prevented from turning in side bars, confining flexing action to hardened steel surfaces between pins and bushings. Principal wearing parts are easily renewable.



**Rex Chabelco® Chain** is an all steel chain of high strength, used extensively for elevating heavy and abrasive bulk materials in cement mills and quarries. Relative light weight combines with strength and hardened wearing surfaces to produce unusual lasting qualities. Also popular as a heavy duty drive chain.

**Does your "moving picture"**



When it comes to moving bulk materials, it's especially important that you get top performance at lowest costs. It makes a big difference in that vital matter of profit or loss. That's why it pays you to investigate the Chain Belt line of materials handling equipment.

Whether your "moving picture" calls for chains and sprockets, belt conveyors, complete bucket elevators, feeders, or apron and pan conveyors, you'll find in the complete Chain Belt line the exact equipment that best fits your requirements for low-cost materials handling.

Rex Engineers are well qualified by years of experience to help you with your design, selection and replacement problems. They are backed by equipment which has been recognized as "tops" in quality for over 60 years. Call your nearest branch office today or write for our new 44 page booklet on Rex Equipment for the Cement and Rock Products Industries. Chain Belt Company, 4649 W. Greenfield Ave., Milwaukee 1, Wis.



**Chain**

ATLANTA • BALTIMORE • BIRMINGHAM • BOSTON  
BUFFALO • CHICAGO • CINCINNATI • CLEVELAND • DALLAS  
DENVER • DETROIT • EL PASO • HOUSTON  
INDIANAPOLIS • JACKSONVILLE • KANSAS CITY  
LOS ANGELES • LOUISVILLE

*Distributors in principal cities*

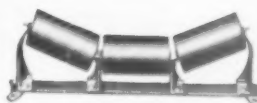




**Rex Heavy Duty Drag Chain** has links of massive construction proportioned for strength and wear. Wide-faced barrel acts as a scraper. Used extensively for handling both hot and cold clinker.



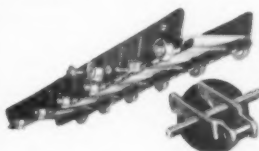
**Baldwin-Rex® Roller Chain** is a high strength, precision-built, finished steel chain widely used in drive applications. Especially suitable where high speeds are encountered. Available in a complete line from 1/4" to 2 1/2" pitch.



**Rex Belt Idlers** are the backbone of all types of belt conveyors. Triple labyrinth grease seal assures longer life and low maintenance costs . . . guards against costly "freeze-ups." Available in a wide range of designs and sizes to suit every application.



**Rex Temperim® Sprockets** have specially hardened rims with extremely uniform tooth contours. They will not wear rapidly even under severely abrasive conditions. Thus, they help to maintain chain pitch and prolong chain life.



**Rex Apron and Pan Conveyors** are ruggedly built for heavy-duty handling of loose bulk materials. Available in a wide variety of styles to meet requirements of the material being handled. Often used for handling extremely hot material. Square through-rod construction adds to long life.

**Rex Standard Bucket Elevators** are made in 3 basic designs . . . Centrifugal Discharge type, Continuous Bucket type and Super Capacity type. All major component parts are made by Chain Belt Company. Specials can be manufactured to order to fit unusual applications.



**Rex Elevator Buckets** are made of either malleable iron or Rex Z-Metal, carefully molded to assure uniform thickness. Corners are well rounded to assure free delivery of materials. Available in a variety of styles, depending on type of material being handled (Style AA shown).

# **Belt COMPANY**

## **OF MILWAUKEE**

MIDLAND, TEXAS • MILWAUKEE  
MINNEAPOLIS • NEW YORK • PHILADELPHIA • PITTSBURGH  
PORTLAND, OREGON • SPRINGFIELD, MASS.  
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in the United States and abroad

# Barber-

MODEL  
**374**

## **HEAVY-DUTY LONG-REACH PORTABLE CONVEYOR**



# **ONE MAN**

**high-capacity loading,  
unloading, stockpiling  
of all bulk materials**

Here is a pneumatic-tired portable conveyor with capacities from 150 to over 425 tons per hour. The B-G 374 can be towed from job to job, pile to pile, and has all the flexibility in use of smaller portable conveyors. It is built for heaviest service, yet one man can operate it to load, stockpile and unload far more tonnage per day than with any

other truly portable conveyor. The 374 will handle sand, stone, wet concrete, coal—any bulk material—at a cost so low that every aggregate producer, contractor, City, County or State Highway Department handling large quantities of materials, should get the full details now on this new heavy-duty machine.

*see your **BG** distributor*

# Greene

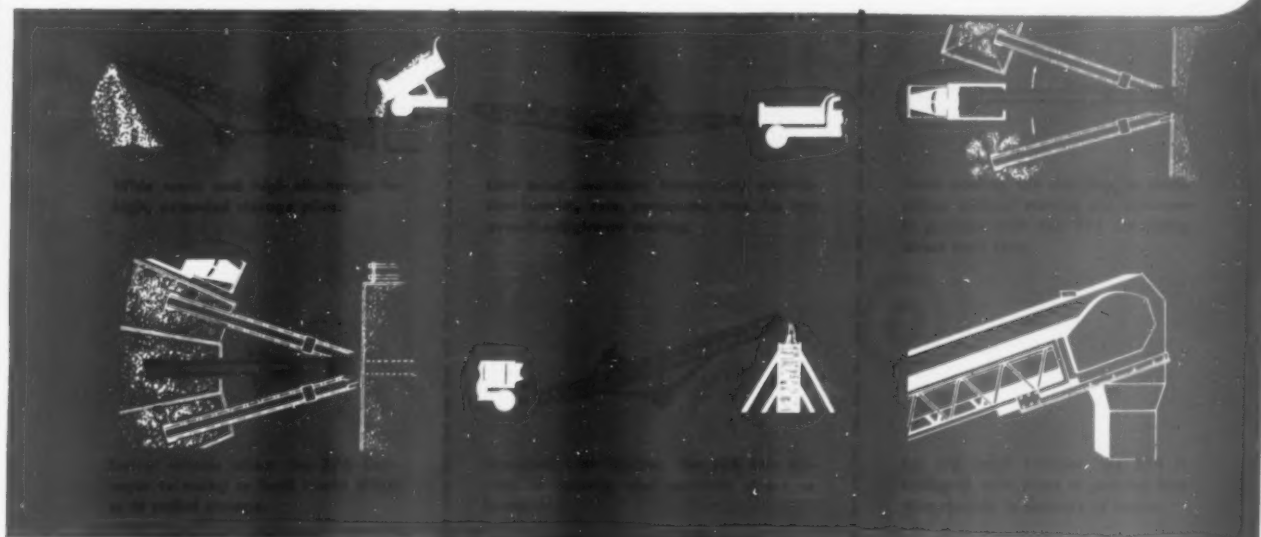
## 150 to 425 TONS/HOUR



### VERSATILE...

Here are a few examples of what the 374 Conveyor, with its complete line of accessories, including feeders, vibrating screens, discharge spouts, loading hoppers,

etc., can do for you in your heavy-duty bulk material handling operations.



### send coupon for details

Available in belt widths of 18", 24" and 30", in lengths from 30' to 60', the 374 can be invaluable to you in these days of restricted manpower and the need for high production operations. Fill in and send this coupon for your copy of the 374 Bulletin.

**BARBER-GREENE COMPANY**

AURORA, ILLINOIS, U. S. A.

Barber-Greene Company  
Aurora, Illinois

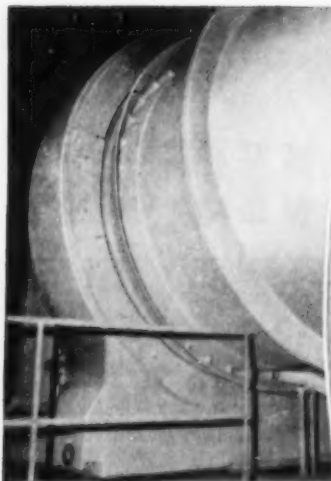
- ☐ Send bulletin on 374 Conveyor.  
☐ Have representative call.

Name .....

Firm Name .....

Address .....

City..... State.....



Cooling air circulates around outside of kiln's discharge end, and on underside of nose castings, as shown. Rotary kilns now in operation can be modernized with installation of air-cooled end.



# *Pays for Itself in 2<sup>to</sup> 3 Years*

## **... IN REFRACTORY SAVINGS ALONE!**

**BIG REFRACTORY SAVINGS . . .** Discharge end of kiln shell stays cool, round and rigid. Refractory brick at discharge end lasts longer because air-cooled discharge end eliminates warpage or end distortion.

**BIG MAINTENANCE SAVINGS . . .** Fewer shut-downs to replace end brick. Less loss of valuable production time. Savings in brick, labor and downtime will pay for air-cooled end several times over during life of kiln.

**BIG FUEL SAVINGS . . .** Air-cooled discharge end makes possible a positive air seal between firing hood and kiln. Temperature inside kiln is not decreased by infiltration of cold air. Result — *fuel savings!*

A-3546

Get more facts from the A-C representative in your area . . . or send for Rotary Kiln Bulletin 07B6368A. Allis-Chalmers, Milwaukee 1, Wisconsin.



# **ALLIS-CHALMERS**

Pulverator is an Allis-Chalmers trademark.

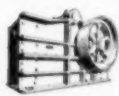
**Sales Offices in Principal Cities in the U. S. A. Distributors Throughout the World.**



Pulverator



Vibrating Screens



Jaw Crushers



Gyratory Crushers

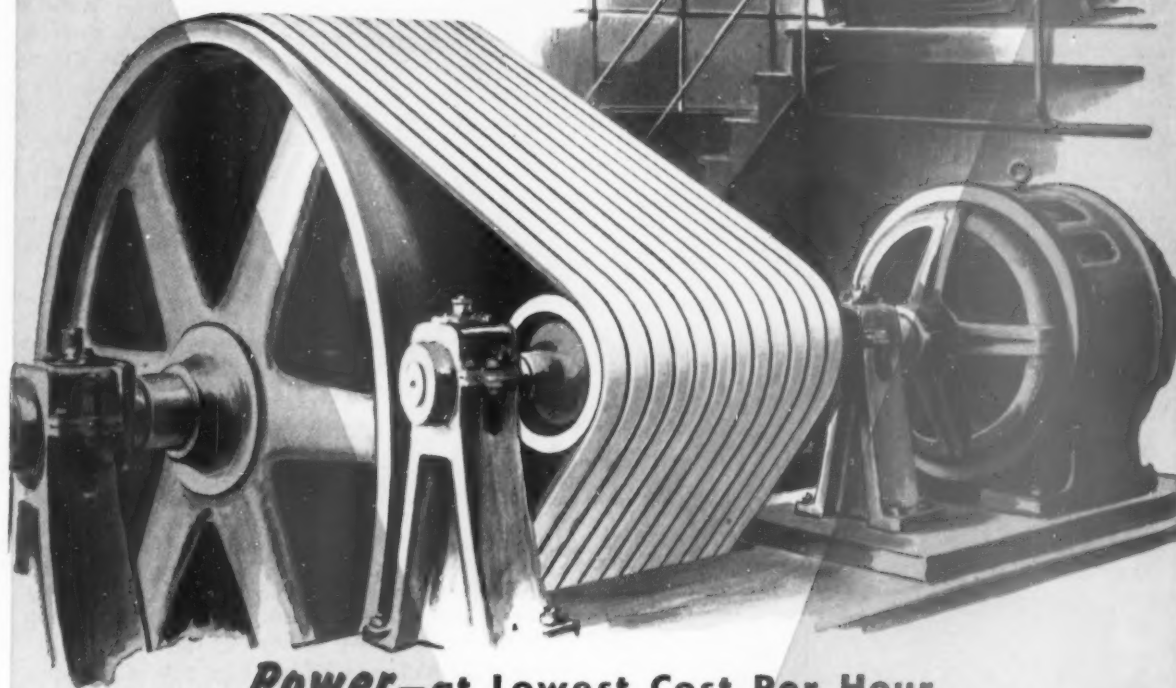
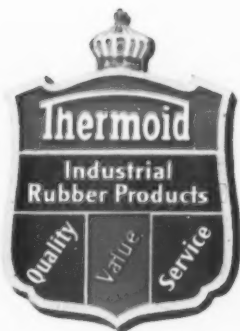


Grinding Mills



Kilns, Coolers, Dryers





**Power—at Lowest Cost Per Hour  
with Thermoid Multi-V Belts**

Thermoid Multi-V Belts are pre-stretched to insure maximum power transmission without adjustment. They are constructed for flexibility and ability to absorb repeated shock loads ... thoroughly impregnated with special rubber compounds to withstand moisture and abrasion, resulting in longer belt life.

Thermoid Multi-V Belts are available in matched sets—uniform in size and cross section. Their longer life and non-slip performance add up to "Power—at the lowest cost per hour."

Your Thermoid Distributor can help you with your power belting problems—whether you need Multi-V, F.H.P. or flat transmission belts. For unusual belt problems, a Thermoid Field Representative is always available to give you the benefit of his experience.

**Thermoid**

Conveyor & Elevator Belting • Transmission Belting  
F.H.P. & Multiple V-Belts • Wrapped & Molded Hose

Rubber Sheet Packings • Molded Products  
Industrial Brake Linings and Friction Materials

Thermoid Company • Offices & Factories: Trenton, N. J., Nephi, Utah

**CONTROLLED  
IMPACT  
ACTION**

# Get **BIG PLANT** **TONNAGE**

**at ROCK BOTTOM COST!**

SHED MOUNTED BREAKER UNIT

RETURN CONVEYOR

PLANT CONVEYOR

Patent  
Pending



**with a PMCO IMPACT MASTER  
HEAVY DUTY IMPACT BREAKER**

Step into big profit operations with minimum plant investment! A PMCO Impact Master setup eliminates secondary crushers and auxiliary equipment... saves on power, labor and maintenance costs... gives you top speed production of top quality aggregate.

With the PMCO Impact Master's high ratio of reduction, the complete crushing job is done in one fast controlled breaking operation. The breaking is accomplished by rigidly mounted rotor hammers, producing a top quality, uniform gradation cubical aggregate. Finished product size is easily controlled, and simple mechanical adjustments change the percentage of sizes. You can use the PMCO Impact Master for producing road building and concrete aggregates, and adjust it for the simultaneous production of aglime when desired.

PMCO Impact Masters have capacities up to 500 tons per hour. Let us give you profit-making details on the size that meets your requirements. Write today.

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## What Are Solutions to Restrictive Regulations?

**T**here seems to be no end to the imposition of restrictive measures on American business which are accumulating to threaten profitable operations. We have crippling and unworkable controls that stifle initiative, regulations that often restrict fair competition, taxes that border on confiscation, one-sided pro-labor thinking among the very top in government and most everything else to discourage enterprise. The most recent threat to business is that of seizure as represented by the take-over of the steel industry by the federal government.

The trouble is that many accept it as inevitable that usual methods of operation must be sacrificed because we have an international emergency, which may be the excuse for extending rigid controls over many years.

In the rock products and concrete products industries, we have examples of discriminatory administration of "emergency" regulations that, if allowed to continue for an indeterminate period of emergency, will have disastrous results. We need only refer to the position of OPS in the case of ready-mixed concrete pricing for a typical example of unrealistic administration of a control law.

Railroad rates have again been increased, and yet OPS gives no hope that ceiling prices for ready-mixed concrete may be adjusted to compensate for a cost increase over which the industry has no control. Instead, the agency is demanding proof that the entire industry is unable financially to absorb the increased transportation costs. That would take a year or more to do, during which time losses in revenue will take on serious proportions. The same kind of procrastination, in failure to grant concessions for the increased expense of necessary out-of-area cement, cost the industry thousands of legitimate dollars.

These industries are also beset with threats at the local level that seem to indicate prejudice against them because of their nature. Our sources of news indicate an almost alarming increase in the number of zoning cases being initiated against the aggregates industries; also a rapidly increasing number of complaints against these industries, charging operations with excessive noise, dirt, threats to driving safety, damage to property and otherwise being nuisances.

Recently it has come to our attention that a state regulation has been proposed to limit blasting which, if enacted, would seriously restrict if not wreck the quarrying industry in the affected area. This proposed regulation is of interest because it demonstrates a new approach to restric-

tive measures which fits into the modern pattern that industry must protect the individual regardless of consequences.

These regulations would establish allowable limits of ground motion and air blast pressure that would be considered protection against structural damage to nearby inhabited buildings and not cause a severe level of human response to persons. Thus, the quantity of explosives permissible would be restricted so as not to exceed allowable limits of maximum amplitude of ground vibration as related to frequency, which figures were tabulated to be less than those which supposedly would result in a normal level of human response.

Actually, this proposed regulation had reached the stage whereby human emotions or reactions to physical stimuli had been reduced to a set of numbers in the form of frequency-amplitude tables for the purpose of limiting blasting operations. Permissible figures as set up were much less than those governing safe practice against structural damage.

As this is written, hearings on this legislation were being conducted and it is believed, and hoped, that the presentation of factual data by informed experts will show that the proposed regulations were based on a false premise and disprove that human reactions can be measured in numbers.

This development serves as a warning that industry must ever be alert to anticipate movements that might otherwise easily be enacted into dangerous law. The same goes for zoning restrictions and other regulations which could jeopardize the industry. Everything must be done within reason in the way of improved operating practices, to forestall criticism from any source; but that in itself is hardly enough.

Two things stand out as necessary to a course of action to guarantee staying in business. One is a program of exerting political pressure to remove the inequities that stem principally from the administration of emergency controls. The second is to get the industry story across to the public. Misinformation or lack of information is responsible for an unaroused public that has permitted government and local agencies to get away with too much regulation which is always at the public's expense.

*Bron Nordberg*

# KENNEDY STRATIFIED AIR SWEEP TUBE MILL SYSTEM\*

with Dual Classification

*for raw stone, ore and clinker grinding  
lowers grinding costs...reduces power  
consumption...cuts maintenance costs*



\*patents pending

Finished Material  
to Storage Silo

- 1 Belt conveyor — feed to crusher
- 2 Vibrating screen
- 3 Oversize return chute
- 4 Gearless gyratory crusher
- 5 Belt conveyor — closing crusher circuit
- 6 Traveling crane
- 7 Clamshell bucket
- 8 Mill feed hopper

- 9 Weighing feeder
- 10 Stratified air swept tube mill
- 11 Cross conveyor for oversize
- 12 Return conveyor for oversize
- 13 Radial flow classifier
- 14 Cyclone collector
- 15 Mill exhauster
- 16 Dust filter

- 17 Dust filter exhauster
- 18 Rotary air locks
- 19 Finished material conveyor
- 20 Automatic pneumatic transport pump
- 21 Hot air furnace
- 22 Instrument and control cubicle
- 23 Automatically controlled tempering air damper

The Kennedy Stratified Air Swept Tube Mill System produces 94% plus through 325 mesh when grinding clinker 2" and finer. It dries and grinds simultaneously and air-cools cement while grinding clinker.

In our test plant, when grinding to 92% through 200 mesh, 25 tests showed an increase in the capacity of the Tube Mill by the use of Dual Classification of from 29% to 52%.

The Kennedy Stratified Air Swept Tube Mill not only

grinds raw material having up to 20% moisture, but becomes a combined dryer, grinding mill and separator, thereby serving a three-fold purpose.

Marked economy of operation sets the Kennedy mill apart. By comparison, the savings effected in power consumption, wear-and-tear and man-hours, more than pay the initial installation cost within a ten-year or shorter period. Send for blue-prints and operating data. They show why users say "It Costs Less To Own The Best."

**KENNEDY-VAN SAUN MFG. & ENG. CORPORATION**  
TWO PARK AVENUE, NEW YORK PLANT, DANVILLE, PA.



# Rocky's NOTES

Nathan C. Rockwood

## Guard Against Walsh-Healey Extension

**T**HE MAJORITY of our producer readers apparently have been well aware of the dangers involved in being placed under the Walsh-Healey (Public Contracts) Act, yet we have had occasion to record some instances where agricultural limestone producers were caught napping. Specifically, details of two such instances where the administrator of the act ruled that producers had been in violation of the act were published in our "Labor Relations Trends" articles in the May and November, 1951, issues. Consistent readers of this page also may recall the article in our February, 1952, issue in which we hailed two U. S. Circuit Courts of Appeals checks on the high-handed methods of the U. S. Department of Labor in two similar instances, that were outside of our industries, but identical issues were involved.

In our industries, at least in the case of quotations, bids and sales of agricultural limestone, which under the soil conservation program of the U.S. Department of Agriculture are made directly to the federal government, it would appear that an attempt has been made to trap unwary producers, in such a way as to bring them under the Secretary of Labor's interpretation of the law, in spite of the \$10,000 limitation on such contracts in the act itself. The bidder is asked, on the prescribed form to be filled in, an apparently innocent question as to whether or not he would be willing to supply more than the stated amount at the price quoted. The wise bidder, first making sure that the total contracted for would amount to less than \$10,000, answers this question with a "no." The unwary one who fails to answer it at all, or inadvertently answers "yes," thereby makes himself subject to the provisions of the Walsh-Healey Act even though the total value of the material actually delivered comes to considerably less than the \$10,000 specified in the act as the minimum for its application. The Secretary of Labor now proposes to extend the coverage by inserting a provision that where an indefinite amount is contracted for, it shall be under the act if there is "capacity to exceed the \$10,000 limit."

Readers of the articles referred to above will recall that the U.S. Department of Labor has successfully used the argument "that where there is an expectation that purchases under a contract will exceed \$10,000, the act is applicable to such contract, even in the event that the value of such goods furnished under the contract falls short of \$10,000." In both the cases reported in ROCK PRODUCTS, the value of the goods furnished under the contract was less than \$10,000. The two U.S. Courts of Appeal did not rule on this point, but only on that involving the application of the two-year limit after which, under the Portal-to-Portal Act, no suit could be brought. The Secretary of Labor had acted on the assumption that this statute of limitation did not apply to a suit by the government to collect liquidated damages; and in this the courts ruled against him.

### Proposed Changes in Regulations

The Secretary of Labor now asks revision of the regulations or his interpretations so that he will be able to enforce the act against many new alleged violators; but the revision would go much farther than that, and would have the prime contractor responsible for seeing that his suppliers, who may not now be under the law, also conform to the requirements in the act. Obviously this *could* affect practically all of our producers who are called upon to furnish materials in any amount to prime contractors on federal government jobs.

In the terms of the proposed revision: "It is expressly agreed and understood that where the contractor, pursuant to such relaxation [that is, where the Secretary of Labor permits him to buy materials in lieu of producing or manufacturing them himself], enters into any arrangement with a secondary contractor for manufacture or supply of the contract commodities, or materials or parts to be used in the performance of the contract, the contractor is charged with the duty of obtaining compliance by the secondary contractor with the requirements of these stipulations to the same extent as if he performed the work himself, and he shall be

liable for any failure by the secondary contractor to observe the requirements of such stipulations; except that this undertaking by the contractor is not applicable where the secondary contractor is an 'auxiliary supplier' within the meaning of Section 201.5(c) of the Public Contracts Act Regulations."

It must be remembered that the Walsh-Healey Act differs from the Fair Labor Standards Act in several respects, being far more restrictive on the theory that while the legal basis for the F.L.S.A. is limited by the interstate commerce clause of the Constitution, there are no such limits in a law which specifies conditions under which the federal government may make its own purchases. Hence the Walsh-Healey Act requires time-and-a-half pay for *every* day worked in excess of eight hours, as well as the time-and-a-half for excess of 40 hr. a week. More than that, the rates paid must be established by the Secretary of Labor as the prevailing minimum wage for work of a similar nature in that locality—actually, however, such rates have been on a national minimum, not on a local basis.

### Safety and Health Provisions

From the very nature of many small sand, gravel, crushed stone, agricultural limestone and ready-mixed concrete operations it is doubtful if they would meet the standards of safety and health set up by the Labor Department regulations. Certainly many lack modern plumbing, etc., which the act has been interpreted to require. In one of the agricultural limestone cases we reported, it was held even that adequate facilities to prevent breathing limestone dust were not provided!

There is a possible out for producers by being classified as an "auxiliary supplier," but the definition of this term is for the Secretary of Labor to determine under his own rules in specific instances. The reference to this is as follows: 201.5 (c) "If it is the regular practice in the industry engaged in the manufacture of the commodities of the type called for by the government contract for members of such industry to purchase certain materials or parts to be used in the production of such commodities rather than to manufacture them, or to have certain operations on the commodities performed by others, the vendor of such materials or parts, or the person performing such operations shall be deemed to be a subcontractor who is an auxiliary supplier and the work performed by him shall not be deemed to be within the coverage of the act."

### Public Hearing June 10

On June 10 a four-day hearing is scheduled at Washington, D.C., by the Public Contracts Division of the U.S. Department of Labor to hear reactions from industry to the proposed changes in the regulations. It promises to be a warm session. Persons

(Continued on page 105)

# What's Behind The **Euclid** Name?



## \* **Dependability**

Euclids are engineered for the job... built for efficient, long life performance in off-the-highway service. In mines and quarries, on construction and industrial jobs, "Eucs" have earned their reputation for durability and low cost operation.

Plenty of power... large capacity for bigger loads... body designs for all types of materials... earth, ore, rock, or coal. Rear-Dump Euclids range in capacity from 10 to 34 tons, have diesel engines from 125 to 400 h.p. Bottom-Dump Euclids have capacities of 13 to 50 cu. yds., 20 to 40 tons with diesel engines to 300 h.p.

Repeat orders prove customer satisfaction. Owners say that "Eucs" actually cost less to own than any other hauling equipment. Euclid dependability will pay off on your present or future jobs. Write for complete information on the Euclid line, or call your distributor today.

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CLEVELAND 17, OHIO

**MORE LOADS PER HOUR—  
MORE PROFIT PER LOAD**



# EUCLID

# LABOR RELATIONS TRENDS

## Quirks in Interpreting Labor Contracts

By NATHAN C. ROCKWOOD

EVERY LITTLE WHILE our attention is drawn to a controversy over interpretation of a clause in a labor contract, which directly concerns these rock products industries. Such controversies, by the terms of the contract, usually are referred to an arbitrator agreeable to both sides. The arbitrator is generally selected from a list submitted by the Federal Mediation and Conciliation Service. They are professionals, and they appear to be doing a fairly satisfactory job as impartial mediators. In the case reported here, the arbitrator was Harry H. Platt.

The controversy involved two entirely different aspects of the contract between Huron Portland Cement Co., Alpena, Mich., and United Stone and Allied Products Workers of America, Branch 135 (C.I.O.). The first point involved was an hourly rate established for a new job, made possible by technological improvements in plant operation, which not only combined two previous jobs, but simplified the requirements, as all such "technological" improvements are of course designed to do. It illustrates the difficulties manufacturers have to contend with in attempting to take full economic advantage of improved machinery and operating techniques.

### New Job Rate Required

What follows is largely in the words of the arbitrator's report (or decision). The hearing took place in Alpena on November 29, 1951. The essential facts submitted by both sides were "not in great controversy." Prior to these improvements designed to simplify and to increase accuracy and efficiency of operations, two employees were assigned to tending raw material conveyors, one stone, the other shale. "Because of the greater responsibility required in the performance of these jobs [at the time they were classified] than in most other conveyor jobs," said the arbitrator, "the negotiated base rates were fixed at 5 cents per hr. more than on other conveyor jobs, such base rate being \$1.30 (not including more recent cost-of-living increases)." In May, 1951, the two jobs were abolished and a new job classification was established, since the latest improvements no longer required the services of two men. The base rate established for this new job was the same as that for each of the old ones, \$1.30.

The union officials challenged the new job rate, contending that this new job required an employee to perform work previously performed by two employees. The union conceded the proper test of whether or not an established rate is fair is to compare it to the rate of a job having similar

duties and requiring similar skills. It insisted, however, that upon making such a comparison the proposed new job was clearly shown to warrant a higher rate than was formerly paid for either of the other conveyor jobs.

The company officials contended that the base rate established for the new job was proper because its duties were comparable to other jobs of the same type with the same wage rate. Regarding the two previous conveyor jobs, it was asserted that the duties of those jobs were gradually reduced through the years by various mechanical improvements and reallocation of work until it was decided to combine the duties of both jobs into one, and that when this was done, the rate for the new job was established in accordance with the yardstick provided by the contract and such rate was proper and fair.

### Contract Provision

The pertinent clause in the contract reads as follows: "It is recognized that changing conditions and circumstances may from time to time require the installation of new rates or adjustment of existing wage rates, because of the creation of new jobs or changes in the duties of existing jobs. When a new job is established, or when changes in an existing job have resulted in a substantial change in the duties of same, the company shall set a temporary rate for same and put it into effect; such rate being subject to review by the union in the manner provided below:

"At the time of putting such temporary rate into effect, the company will notify the president of the union of its action. If the union wishes to negotiate for a revision of such rate, it shall notify the superintendent within 15 days after notice from the company has been given. If after a meeting of the parties, no agreement is reached, the union may file a grievance within 15 days after such meeting; the basis of such grievance being the question of fairness of the rate and duties of the job involved with the rates and duties of other jobs covered by this agreement.

"The rate determined at the conclusion of negotiations or grievance procedure shall be retroactive to the original date when the temporary rate was put into effect."

The arbitrator ruled that the time to have adjusted the wage rate for the two previous conveyor jobs, as the duties required were simplified or reduced by installation of mechanical improvements, was at the time the improvements were made. The company erred, he decided, in not comparing the new job duties and rate with the duties and rates of these two old jobs,

"as they existed at the time the new job came into being." It is not too clear what is meant, but apparently the previous jobs had become so easy in comparison with the new job, that if they were paid at the base rate of \$1.30, the new job must necessarily rate higher. The arbitrator did not suggest the higher rate but remanded the grievance to the parties for such disposition. That seems a lot of palaver over a matter of a few cents per hour for a single job, but it is probably typical of present-day management problems.

### Guaranteed Work Week?

The second issue resulted from a strike called against Huron Steamship Co., which serves the cement company mill with some raw materials and fuel, and the company's various packing plants with clinker and cement, by the Seafarers International Union, A.F. of L. A picket line was established around the cement plant, obviously to prevent its employees from continuing their work. Anticipating the necessity of shutting down the kilns and possibly other parts of the mill, the company officials notified employees of the contemplated shutdown. Subsequently, the company decided on at least limited operation and notified all employees by every means available to report for work despite the Seafarers' picket line.

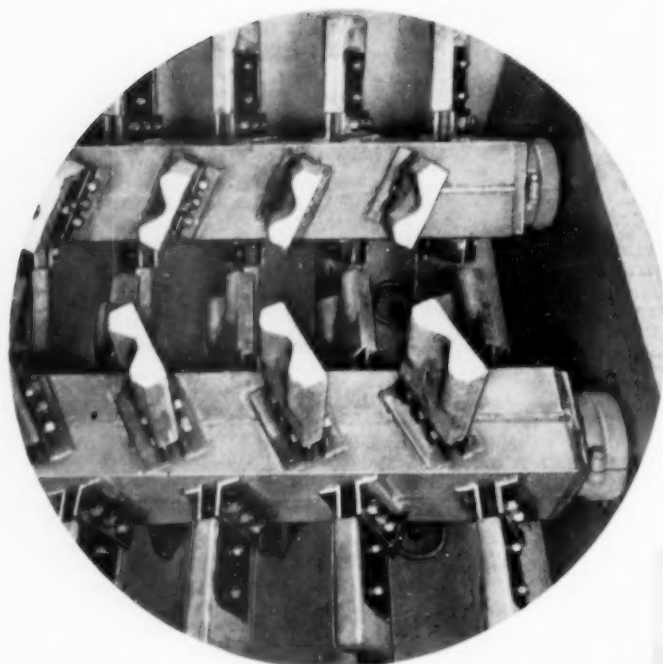
Some employees failed to respond and refused to cross the picket lines. These, through their union, sought pay for the time they did not work, under a contract provision which they contended guaranteed them a 42-hr. work week. The Seafarers' strike lasted only a couple of days, so that while the sum involved was little, there was an important principle at stake.

The union contended that in deciding to close down the company in effect laid off the aggrieved employees and thereby breached its guarantee to provide them with an average of 42 hours' employment per week over periods of four weeks. It was claimed that the company's refusal to operate its plant because of fears of damage to machines, while unfounded, nevertheless was not an excuse for failure to comply with the terms of the contract agreement. Hence, the aggrieved employees were entitled to the two days' pay they didn't work.

The company officials denied these claims and insisted that the contract provisions were never intended by either party as a guarantee of any specified number of working hours per week, or as prohibiting the company from shutting down its operations at any time or under any circumstances. In other words, the company said, "when we talk about a regular work week, we are not talking about any guaranteed work week. We are talking about the usual, customary work week. Certainly if there had been any intention of a guaranteed

(Continued on page 105)





## AN EAGLE LOG WASHER WHIPS "CLAY BOUND" AGGREGATE PROBLEM FOR POWLEY SAND & GRAVEL CO. EAST PEORIA, ILLINOIS

AN Eagle Log Washer, (1) in view at right, has licked the cemented aggregate and clay ball problem for Powley. Material from top deck of 3-deck screen is chuted to a 7' x 30' Log Washer. Corrugated paddles go to work on it, loosen it up and free clay and debris which are floated away. Clean gravel goes to screen mounted over bins at left. Material from second deck of screen over bins at right is chuted to an Eagle 24" x 22' Single Screw Fine Material Washer (2) for washing and classifying of one gradation of material. Sand from bottom deck of same screen is chuted to an Eagle 29" x 22' Fine Material Washer (2) for retention of another gradation of material. Troubled with clay or silt in your aggregate? Investigate Eagle Log and Screw Washers!

THE readily replaceable, corrugated Ni-Hard Metal paddles do the trick—they abrade and loosen even the stickiest conglomerates, break down clay from gravel—rising column of water in tub washes clay "overboard." Paddles convey gravel to discharge at upper end of tub. Eagle's long experience is evident in the many refinements and plus performance of these profit-making log washers.



Photos Courtesy Universal Engineering Corp.



# EAGLE IRON WORKS

137 Holcomb Ave.  
Des Moines, Iowa



Screw Washers



Log Washers



"Swink's"  
Dredge Ladders



Clay  
Crushers



Clay and  
Cinder Grinders



Shale  
Planers



Coal  
Crushers



# PEOPLE in the news

## President of Ideal

CRIS DOBBINS has been elected president of Ideal Cement Co., Denver, Colo., to succeed C. K. Boettcher, who



Cris Dobbins

has been named chairman of the board. J. A. McCarthy is vice-chairman of the board. M. O. Matthews, who was vice-president and general manager of the Southern division, Ada, Okla., succeeds Mr. Dobbins as



C. K. Boettcher

executive vice-president. T. W. Rosebaugh has been appointed vice-president of the Pacific division. C. B. Flick has been named treasurer to succeed G. W. Ballantyne, who continues as secretary. O. F. Counts remains as comptroller. Albert G. Stubblefield has been appointed sales manager at

Butte, Mont., to succeed George N. Short who passed away on February 14.

## Assistant Director

JULIEN F. PHILLIPS, plant development engineer for American Potash and Chemical Corp. at Trona, Calif., since 1947, has been appointed assistant director of research. He succeeds Henry Suhr who has resigned. Mr. Phillips has been with the department since 1934 when he took a position as research assistant. Since then he has been a junior research engineer, chemist's associate, research engineer and special research engineer.

## Administrative Assistant

DOUGLAS MCHENRY, formerly head of the Concrete Laboratory Section of the U.S. Bureau of Reclamation, Denver, Colo., has been appointed ad-



Douglas McHenry

ministrative assistant to Dr. A. Allan Bates, vice-president for research and development, Portland Cement Association, Chicago, Ill. Mr. McHenry is well known for his articles on concrete technology and for his work while head of the Structural Research Section of the Engineering Laboratories Branch of the Bureau of Reclamation, prior to his appointment as head of the Concrete Laboratory Section. In 1943 he received the Sanford E. Thompson Award of the A.S.T.M., and in 1944 the Telford Award of the Institution of Civil Engineers of Great Britain, for papers dealing with structural behavior and research, and concrete design problems.

## Elected President

GILBERT K. MITCHELL has been elected president of the New York Coal Sales Co., Columbus, Ohio, to succeed Edwin H. Davis, who has been made chairman of the board. Robert M. Patton, recently appointed vice-



Gilbert K. Mitchell

president in charge of operations, has been named executive vice-president. Clarence P. Shaw has been made assistant executive vice-president; Hayes H. Moore, vice-president in charge of cement operations; and George W. Quillin, secretary and treasurer.



Edwin H. Davis

## Council Director

HENRY W. COLLINS, executive vice-president and director of The Celotex Corp., Chicago, Ill., has been re-elected a member of the board of directors of the Producers Council.

## Receive Award

OLIVER M. KNODE, president, and Clarence H. Shaver, chairman of the board of United States Gypsum Co., Chicago, Ill., recently received a testimonial from the National Association of Home Builders in appreciation of the company's "outstanding contributions in research and development leadership." The presentation was made by W. P. Atkinson, president of the association.

## On Engineering Staff

BYRON A. BLEDSOE, formerly engineer of traffic and operations, Highway Research Board, National Academy of Sciences, Washington, D.C., has been appointed engineering representative at the Atlanta, Ga., office of Universal Concrete Pipe Co., Columbus, Ohio. A graduate of the University of Tennessee and the Yale University Bureau of Highway Traffic, Mr. Bledsoe is an associate member of A.S.C.E., a member of the Georgia Engineering Society, National Research Council Conference on Highway Safety and the Institute of Traffic Engineers.

## On Board of Directors

J. H. ROBINSON, general works manager of Gypsum, Lime and Alabastine, Canada, Ltd., Toronto, Canada, has been elected to the board of directors. He has been on the operating staff of the company since 1921, prior to which time he was associated with the gypsum industry in the United States. The company has 17 plants mining and milling gypsum products and lime throughout Canada, all of which are under Mr. Robinson's direction. He is a member of the Association of Professional Engineers of the



J. H. Robinson

Province of Ontario and of the Canadian Institute of Mining and Metallurgy. He has served on Committee C-7 of the American Society for Testing Materials and is a member of the National Lime Association, Washington, D.C.



Mathew J. Ludwig

## Vice-President-Controller

MATHEW J. LUDWIG has been appointed vice-president and controller of Basic Refractories, Inc., Cleveland, Ohio, and Theodore Thomas has been named assistant controller. Mr. Ludwig was formerly secretary and will be succeeded in this position by William A. Melville, who has been assistant secretary. Other officers of the company are Dan P. Eells, chairman of the board; Howard P. Eells, Jr., president; Samuel Eells, vice-president of sales; Harley C. Lee, vice-president-technical; and William P. Kelly, treasurer.

## Elected President

DWIGHT A. SYMMES has been elected president of Glens Falls Portland Cement Co., Glens Falls, N.Y. He succeeds Horace E. Harding, who has been elected chairman of the board. Mr. Harding is successor to Lowell R. Burch, who retains his place on the board of directors. Other officers elected are J. Edward Singleton, vice-president and counsel; Stanley H. MacArthur, vice-president in charge of sales; Robert C. Carter, Sr., secretary-treasurer, and Loren F. Goodson, assistant secretary-treasurer. Mr. Harding had served as president of the company since 1943 and has served as a director since 1933. Mr. Symmes, who has been with the company since 1942, was elected a director in 1944 and vice-president in 1949.

## Sales Engineer

ROY JACKSON, former controller of Kingston Trap Rock Corp., Kingston, N.J., has been appointed sales engineer for Peapack Limestone Quarry, Somerset Crushed Stone, Inc., and A. Ferrante and Sons, Bernardsville, N.J. Mr. Jackson was executive secretary of the Raw Materials Division of the National Advisory Commission, and administrative officer of the Office of Production Management prior to joining the Ferrante corporations.

## Sales Engineer

ROBERT H. GATES has been appointed sales engineer for Universal Concrete Pipe Co., Columbus, Ohio, which has been named a licensee of The Flexicore Co., and will have charge of sales of Flexicore prestressed concrete slabs in Florida. Mr. Gates was graduated from the University of Dayton with a B.C.E. degree, and is a registered engineer and surveyor. Before joining Universal, he specialized in Florida Flexicore sales and construction for W. R. Bonsal Co., Lilesville, N.C.

## Superintendent Retires

E. R. CHEEK, superintendent of the Dewey, Okla., plant of the Dewey Portland Cement Co., Kansas City, Mo., has retired after 44 years of continuous service with the company. Mr. Cheek started his business career in 1904, erecting gas compressors for the Logan Gas Co. Two years later he was transferred to the Petrolia Station of the Kansas Natural Gas Co. near Chanute, Kan., where he spent two years erecting gas compressors and operating the station. In 1908, Mr. Cheek joined the Dewey Portland Cement Co. as chief powerhouse engineer. During his association with the company, Mr. Cheek attained considerable prominence in the engineering world when he operated seven gas engines on a common electrical load at the Dewey, Okla., plant; the installation of a gasoline extraction plant to take care of the casinghead or natural gasoline in the use of gas for the engines and in the cement plant kilns; and the operation of the first waste heat power plant in a cement plant in the Middle West to em-



E. R. Cheek

ploy the use of waste gases from cement kilns to create necessary power for plant operation.

With Mrs. Cheek, Mr. Cheek plans to retire to his 70-acre farm two miles north of Dewey, Okla., where he has resided for the past several years.



William F. Atkins

### Sales Manager

WILLIAM F. ATKINS, Schenectady, N.Y., has been appointed district sales manager in Maryland, Pennsylvania and western New York for Lehigh Materials Co., producer of Lelite lightweight building aggregate, it was recently announced by Evan Evans, president. Mr. Atkins, before joining Lehigh Materials Co., was a manufacturer's agent in concrete, tile and brick masonry units at Erie, Penn. Prior to that he was associated with Goodyear Tire and Rubber Co., Kelsey Clay Co. at Mineral City, Ohio, and had also served as a buyer and supervisor for General Electric Co.

### Vice-President and Director

J. O. HEPPEL, general manager of the Azrock Products division of Uvalde Rock Asphalt Co., San Antonio, Texas, has been elected a vice-president and director, and W. K. Clark has been named sales supervisor in the Azrock division. District representatives appointed are: F. E. King, Jr., Atlanta, Ga.; John P. Johnston, Oklahoma City, Okla.; Everett E. Herrick, Dallas, Texas, and C. E. Ludlow, Lubbock, Texas.

### Committee Chairmen

JAMES H. ACKERMAN, president of Dragon Cement Co., New York, N.Y., and William J. McCormack, Sr., of Transit-Mix Concrete Corp., New York, N.Y., have been appointed chairmen of the Cement division and the Building Materials division, respectively, of the New York City Cancer Committee for the 1952 Cancer Crusade. Frederick W. Reinhold, president of Anchor Concrete Products, Inc., Buffalo, N.Y., has been appointed New York State chairman of the 1952 Cancer Crusade in the Buffalo area. He served as general chairman of the Buffalo and Erie County Cancer Crusade in 1950 and 1951.

### Association Director

MELVIN H. BAKER, chairman of the board of National Gypsum Co., Buffalo, N.Y., has been elected a director of the National Association of Manufacturers for the year 1952.

### General Manager

JAMES G. LUND, who has been in charge of engineering and sales for Concrete Sectional Culvert Co., Fargo, N.D., since 1946, has been appointed general manager, according to an announcement by John B. Jardine, vice-president of the company.

## OBITUARIES

JOHN G. MUNSON, former president of the Michigan Limestone and Chemical Co., and the Bradley Transportation Co., Rogers City, Mich., died recently at the age of 77. Born in Bellefonte, Penn., Mr. Munson was graduated from Yale University in 1905. From 1906 to 1908, he was su-



John G. Munson

perintendent of construction in New Haven, Conn., and Baltimore, Md. He was construction superintendent for J. G. White Engineering Corp. from 1909 to 1919, when he became operating manager of the Michigan Limestone and Chemical Co. and the Bradley Transportation Co. Nine years later he became president of both companies.

JOHN JAMES MCINNIS, president of the Eagle Rock Lime Co., Eagle Rock, Va., died recently in Georgetown University Hospital, Washington, D.C. He was 46 years old. Mr. McInnis was educated at St. John's Preparatory School, Danvers, Mass., Georgetown University, and Harvard Law School. During World War II he enlisted as a private in the Air Force and served three and a half years in the United States and Europe. He was discharged as a First Lieutenant.

Mr. McInnis practiced law in Boston before joining his uncle, James McNamara, and his aunt, Miss Helen McNamara, in business in Eagle Rock. He bought and operated the Southern Lime and Stone Works, Linville, Va., and was a vice-president of the James River Hydrate and Supply Co., Buchanan, Va. Mr. McInnis was an active member of the National Lime Association and attended the Spring conventions regularly, as well as the Operators' meetings.

RICHARD LEE SCHMIDT, owner of the Capitol Concrete Products Co., Topeka, Kan., died April 10 in a Topeka hospital. He was 41 years of age.

JOHN HENRY PRATT, a pioneer in the phosphate industry, died April 1 at his home in Tampa, Fla., after a long illness. He was 95 years old. Mr. Pratt settled in Bartow, Fla., in 1895 and was active in the discovery of pebble rock phosphate in Polk and Hillsborough counties. He had made his home in Tampa since 1909, where he operated the Pratt Laboratory until his retirement in 1940.

ROBERT L. MENUET, president of the Central Sand and Gravel Co. and the Central Culvert Corp., with plants in Alexandria, West Monroe and Shreveport, La., died suddenly on March 31 at the age of 51.

HARRY PENNIMAN, JR., general sales manager of the Texas Panacalite Co., Dallas, Texas, died on March 30 at the age of 54. He attended Terrill School for Boys in Dallas and the University of Michigan. Shortly after World War I, Mr. Penniman, in partnership with his brothers, formed the Penniman Concrete and Material Co. In the early 1930's his firm brought the first transit-mixing trucks to Dallas.

PAUL M. COOGAN, owner of the Coogan Gravel Co., Chillicothe, Ohio, died April 10. He was 55 years old.

CUTLER D. PERRY, president of the Troy Slag Products Co., Troy, N.Y., died April 10 at his home in Menands, N.Y. He was 66 years of age.

FRANK ELLIOTT GUY, retired general traffic manager of Universal Atlas Cement Co., New York, N.Y., died suddenly on April 14 at the Pittsburgh Traffic Club. He was 75 years old. Born in Enon Valley, Lawrence county, Penn., Mr. Guy was educated at schools in Pittsburgh and Crafton, Penn. He joined Universal Atlas at Pittsburgh in 1907 as traffic clerk and six years later was appointed assistant Eastern traffic manager. In 1929, he became Eastern traffic manager at Pittsburgh and later traffic manager at Chicago. He was appointed general traffic manager at New York in 1938. Since his retirement in 1945, Mr. Guy had been sales representative for his son-in-law's firm, Earl J. Rigdon & Co., wire and rope distributors.

# "TEXACO URSA OIL X\*\* HELPS US KEEP OUR DAM WORK ON SCHEDULE"

— say Edward E. Morgan Co., Inc., and Jones & Gillis, Inc.



Construction equipment, lubricated and fueled with Texaco, at work on the Morganza embankment, part of the flood control program on the lower Mississippi. Joint contractors are Edward E. Morgan Co., Inc., and Jones & Gillis, Inc. Dirt-moving operations, started in June, 1949, call for placing 3,985,000 cubic yards of semi-compacted embankment. Equipment includes 4 draglines, 9 tractors and 53 trucks — all of which are lubricated with Texaco exclusively.

Heavy rains slowed early stages of placing nearly four million cubic yards of embankment for the Morganza Control Structure. Construction machinery was idled for days at a time. This made it vital that, when work could be resumed, there be no delays due to equipment failure.

"Diesel engines in all our earth-movers," report the contractors, "were lubricated with *Texaco Ursa Oil X\*\**. They ran perfectly even under the severe conditions often imposed. We found, on this as on other jobs, that *Texaco Ursa Oil X\*\** is a big help in reducing fuel consumption and keeping maintenance costs low."

*Texaco Ursa Oil X\*\** cleans as it lubricates. Its fully detergent and dispersive properties keep harmful carbon, sludge and gum from forming. Better compression and combustion result, wear is reduced, bearings are protected against corrosion. Engines run better; parts last longer.

Let a Texaco Lubrication Engineer tell you more about *Texaco Ursa Oil X\*\** and how you can reduce your costs with the Texaco Simplified Lubrication Plan. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write:

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# industry news

## A.S.T.M. Meeting

THE AMERICAN SOCIETY FOR TESTING MATERIALS will hold its 50th anniversary meeting, June 23-27, at the Statler and New Yorker hotels, New York City. All exhibits will be at the Statler. Thirty technical sessions have been scheduled, at which time a large number of technical papers on the properties and testing of materials will be presented. In addition to the technical sessions there will be the tenth exhibit of testing apparatus and laboratory supplies and the eighth photographic exhibit.

At the session on "Factors Affecting the Durability of Concrete," sponsored by Committee C-9 on Concrete and Concrete Aggregates, the following papers will be presented: "Experimental Exposure of Concrete to Natural Weathering in Marine Locations," by H. K. Cook, Corps of Engineers, U. S. Army, Waterways Experiment Station; "Studies of Abnormal Expansion of Portland Cement Concrete Containing Sand-Gravel Aggregate Common in the Central Great Plains Region of the U.S.," by A. D. Conrow, Ash Grove Lime & Portland Cement Co., Kansas City, Mo.; "Performance of Concrete Specimens During Ten Years' Exposure to Severe Natural Weathering," by W. J. McCoy and S. B. Helms, Lehigh Portland Cement Co., Allentown, Penn.; "Significant Factors Affecting Concrete Durability," by C. H. Scholer, Kansas State College; "Correlation of Sodium Sulfate Soundness of Coarse Aggregate with Durability and Compressive Strength of Air-Entrained Concrete," by C. A. Vollick and E. I. Skillman, U.S. Bureau of Reclamation.

## Bentonite Processing Plant

COLO-TEX MINING AND ENGINEERING Co. recently completed construction of a bentonite processing plant at Las Animas, Colo., on land bordering the Santa Fe tracks. The bentonite will be mined in the southern part of Bent county and brought to the plant for processing.

The chief local use of the product will be as a waterproofing agent in lining irrigation ditches, canals, dams, reservoirs, ponds, storage tanks, etc. The company plans to hold a demonstration of the use of bentonite in reservoirs. The demonstration will be under the guidance of the Soil Conservation Service.

Among some of the many uses of bentonite are: in foundry molding sands for casting steel, iron and non-ferrous metals; in synthetic molding sand; in oil-well drilling for thicken-

ing, suspending and wall sealing; in insulation block, plasters and cements, as a plasticizer and bond; in concrete as an admixture; in agricultural and horticultural sprays, insecticides and fungicides; in purification of water supplies and treatment of sewage and sludge; in ceramic bodies to improve the strength of lean clays and the quality of fired product, and to plasticize and bond nonplastic ceramic materials; in rubber latex, adhesive and reclaimed rubber dispersions; as an emulsifying agent for bitumens, asphalts, oils, resins, etc.; in polishes, cleaners, grinding pastes, etc., as a thickening and suspending agent; and also in pharmaceuticals, paper manufacture, welding rod coatings, and cold water paints and calcimines.

## Australian Cement Plant

BRITISH RUGBY PORTLAND CEMENT Co. recently announced plans to build a 100,000-ton annual capacity cement plant at Freemantle, Australia. Cost of the project was estimated at \$4,500,000. A new proprietary company will be formed at the new location by the Rugby company.

## Soil Stabilization

A THREE-DAY CONFERENCE ON SOIL STABILIZATION will be held at Massachusetts Institute of Technology, Cambridge, Mass., June 18-20, 1952. Among the topics to be discussed will be types of stabilization, the mixing and placing of stabilized soils, and the practical applications of soil stabilization. Manufacturer representatives will present papers on stabilization equipment.

Sponsoring the conference with M.I.T. are Bureau of Yards and Docks, U.S. Navy; Corps of Engineers, U.S. Army; Highway Research Board; Massachusetts Department of Public Works; and the U.S. National Council on Soil Mechanics and Foundation Engineering.

## Highway Congress

THE FOURTH HIGHWAY TRANSPORTATION CONGRESS, sponsored by the National Highway Users Conference, Inc., was held May 6-8, 1952, at the Mayflower hotel, Washington, D.C. "Adequate Roads for a Strong America" was the theme of this year's meeting.

Subjects discussed at the meeting included "Fitting the Roads to the Needs;" "How to Pay for the Roads;" "Getting Roads for Defense;" and "How to Shoot for PAR (Project—Adequate Roads)."

## Cement Company Financing

CALAVERAS CEMENT Co. directors, San Francisco, Calif., recently announced plans for a combination bank and insurance company long-term loan, totaling \$2,200,000. The plan provides for a \$1,000,000 loan from the Bank of America, for five years at 3½ percent, and a \$1,200,000 loan from Mutual Life Insurance Co. of New York, for 15 years at 4¼ percent.

Funds will be used for the redemption of all outstanding 4¼ percent income debentures due December 31, 1966, completion of the financing of current plant expansion, and addition to working capital.

The company has been granted a certificate of necessity permitting a five-year write-off of 70 percent of its \$2,235,106 plant expansion program.

## Asbestos Plant

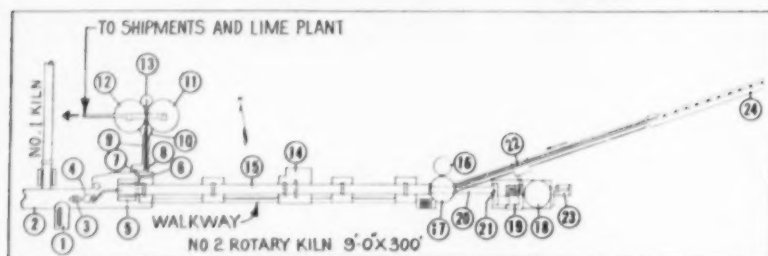
A \$10,000,000 PLANT with a capacity of 5000 tons of asbestos per day will be built at Coleraine, Canada, near Thetford Mines, as was recently announced by Premier Duplessis. Construction of the plant will start this spring and will require 2½ to 3 years for completion. The plant will employ between 300 and 400 persons and will have an annual payroll of approximately \$1,500,000.

## Cover Picture

ONE OF THE LARGEST cement plants in Europe, the new Shoreham, England, plant of British Portland Cement Manufacturers, Ltd., has a capacity of 350,000 tons per year. A definite attempt was made to fit the plant unobtrusively into a rural area by building the major portion of the plant in a quarry used by the older plant which was replaced by the new one.



Modern ideas of handling and storage of large quantities of bulk materials were followed so far as the site would allow. The wet process mill utilizes chalk as the principal raw material, and has two 350-ft. rotary kilns. A complete description of the plant was published in the February, 1952, issue of ROCK PRODUCTS, p. 110.



Equipment arrangement of Warner Co.'s new rotary kiln installation at Cedar Hollow. No. 1 kiln (at left) had been installed previously. Numbers refer to the equipment above: (1) control room; (2) coal bunkers; (3) poidometer coal feeder; (4) coal mill; (5) lime coolers; (6) apron conveyor; (7) crusher; (8) bucket elevator; (9) elevated belt conveyor; (10) reject bin; (11-12) pebble lime storage bins; (13) small pebble lime storage bin; (14) kiln drive; (15) kiln; (16) screening from feed bin; (17) feed bin, feeder, screen; (18) stack; (19) gas scrubber; (20) flue breeching; (21) fan; (22) inclined belt conveyor; (23) thickener tank; and (24) stone storage over reclaiming tunnel belt conveyor

## Warner Completes Switch To Rotary Kilns

WARNER Co., Philadelphia, Penn., has started production from the new rotary lime kiln at its Cedar Hollow plant. Production has been stopped at all of the company's shaft kilns, and the two rotary kilns at Cedar Hollow now produce all the company's dolo-

mitic lime. The new No. 2 kiln, a 9-x 300-ft. unit, has more than 1½ times the combined daily capacity of all the shaft kilns formerly operated. The company expects the installation to place it in a favorable position to expand its market for dolomitic lime products. In addition, rotary kiln pebble lime, since it is more active than shaft kiln lump lime, has been in greater demand in recent years, parti-

cularly by the chemical industry. One of its advantages is the ease with which the lime can be loaded and shipped in covered hoppers-bottom cars and then unloaded and handled at the destination plant.

Included in the new installation is a control panel arranged to take care of both rotary kilns. Draft gauge, speed indicator with chart, motor control buttons, damper position indicator, ammeters for the coal mill, kiln and fan, and potentiometer for temperature recording are provided for each kiln separately. The new kiln has an experimental smoke detector which it is hoped will enable operators to control combustion at night when the stack cannot be seen.

The new rotary kiln was designed and erected by the Warner Co. engineering department, under the direction of Irving Warner, vice-president. E. L. Shoemaker, chief engineer, supervised the structural and foundation work. L. T. Laufenberg was project engineer, and A. I. Martindale supervised mechanical and electrical work. Erection of the kiln was under the supervision of S. G. Frederick, construction superintendent.

## Pension Plan Booklet

"HOW TO EXPLAIN Your Pension Plan to Employees," is a new 16-page booklet prepared to assist employers in explaining pension and retirement plans to their employees. Examples of methods used by leading employers are included. It was pointed out that although employers are investing substantial sums in pension plans, they are doing very little to realize the highest possible return on that investment in form of employee goodwill and cooperation, mainly because of inadequate or overcomplicated explanation. It was emphasized that the plan should be "sold" to the employees and not just announced.

Single copies of the booklet may be obtained free of charge from the Employee Benefit Plan Review, 166 W. Jackson Blvd., Chicago 4, Ill.

## A.I.M.E. Meeting

THE FALL REGIONAL MEETING of the Industrial Minerals Division, American Institute of Mining and Metallurgical Engineers, will be held in Chicago, Ill., September 3-6, concurrent with the fall meeting of the A.I.M.E., to participate in the Centennial of Engineering Celebration.

Field trips, to be held September 3 and 4, will include visits to Illinois Brick Co., Blue Island, Ill.; Indiana Molding Sands, Dune Sand State Park; Standard Silica Corp., Ottawa, Ill. (open and underground mining of silica sand, washing and processing); Illinois Clay Products Co., Goose Lake, Ill. (selective open-pit mining of illite for bonding clay, open-pit mining of "fire clay," a mix-

ture of kaolinite and illite, and special acid treatment for refractory purposes).

Technical sessions to be held September 5 and 6 will include discussions on building materials; industrial groundwater, featuring description of methods used in exploration for developing and production of groundwater for industry; and a survey of industrial minerals locally produced or imported for use in the Chicago area.

## Changes Name

THOMPSON-STAUBS QUARRIES, INC., Kansas City, Kan., is the new name of the company formerly known as Thompson Crushed Rock Co. The new firm, of which Leonard H. Strauss is president, is under the same executive management and has the same staff as the predecessor company.

## Portland Cement Production

THE PORTLAND CEMENT INDUSTRY produced 16,545,000 bbl. of finished cement in February, 1952, as reported to the Bureau of Mines. This was an increase of 9 percent compared with the output in February, 1951. Mill shipments totaled 14,362,000 bbl., an increase of 27 percent from the February, 1951, figure, while stocks were 10 percent above the total for the same month in 1951. Clinker production during February, 1952, amounted to 18,541,000 bbl., an increase of 9 percent compared with the corresponding month of the previous year. The output of finished cement during February, 1952, came from 151 plants located in 36 states and in Puerto Rico. During the same month of the previous year, 15,201,000 bbl. were produced in 150 plants.

## Coming Conventions

May 15-17, 1952—

National Industrial Sand Association, 17th Annual Meeting, The Homestead, Hot Springs, Va.

May 21-22, 1952—

Empire State Sand, Gravel and Ready Mix Association, Annual Meeting, Binghamton, N.Y.

June 3-4, 1952—

National Agricultural Limestone Institute, Hotel

Sheraton, Chicago, Ill.

June 13-15, 1952—

Concrete Products Association of Washington, 23rd Annual Summer Meeting, Harrison Hot Springs, B.C., Canada

June 23-27, 1952—

American Society for Testing Materials, 50th Anniversary Meeting, Hotels Statler and New Yorker, New York, N.Y.

## Sand and Gravel Production

PRODUCTION OF SAND AND GRAVEL in 1950 amounted to 370,455,000 short tons, valued at \$295,040,000, as reported by producers to the Bureau of Mines. This was a record production, representing a 16 percent increase in tonnage over that of the previous year; the average value increased 3 percent. Approximately 70 percent of the total production was supplied by commercial plants, with the remaining 30 percent by federal, state, county and municipal governments.

California, as in recent years, was the largest producer, followed by Michigan, New York, Wisconsin, Illinois, Texas, Ohio, Minnesota and Pennsylvania, respectively. These nine states, each with an output exceeding 13,000,000 tons, accounted for 51 percent of the total production.

Production of sand and gravel, in the various classifications, was as follows:

Use	Short tons	
	1950	1949
Sand		
Glass	5,149,656	4,339,033
Molding	8,139,804	6,113,520
Building	70,563,295	60,911,353
Paving	47,721,509	38,944,407
Grinding and polishing	1,299,760	1,080,886
Fire or furnace	372,890	318,373
Engine	1,399,176	1,883,580
Filter	277,134	189,243
Railroad ballast	901,580	955,996
Other	2,475,129	2,300,240
Gravel		
Building	62,309,484	52,921,200
Paving	156,520,788	136,309,091
Railroad ballast	9,451,187	10,440,079
Other	3,274,239	2,393,486

## California Minerals

THE JANUARY, 1952, ISSUE of *California Journal of Mines and Geology* contained the annual report of the state mineralogist and reviewed the activities of the California mineral industry which had a value of over a billion dollars in 1949. Production of miscellaneous stone amounted to \$42,792,972, which was said to be the highest in the nation. California was reported to be second in the manufacture of cement which had a value of \$57,464,213, and also ranked high in the value of pumice, perlite, gypsum, clay, diatomite, glass sand and stone produced during the year.

## Paper Bag Development

L. O. ROBINSON, (retired) sack and claim supervisor, Universal Atlas Cement Co., New York, N.Y., at the packaging conference of the American Management Association, held in Atlantic City, N.J., April 1-3, predicted that with all the new devices coming on the market, there will probably be a radical change in the paper package for cement and other rock products.

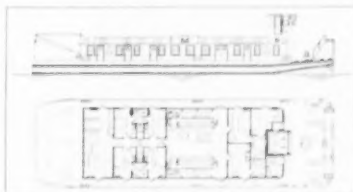
Knowing some of the problems that are encountered in packing paper bags through a small valve, he believes that eventually a machine will be perfected

that will pre-weigh the product, place it in a paper bag of open-end construction, sew the open end together and deliver the package to the conveyor for loading into the car. One man would feed the empty bags into the machine and, with the weighing, filling and closing of the bag being automatic, the package would not be handled again until it arrived in the railroad car ready for stacking.

## Diesel Towboat

MATERIAL SERVICE CORP., Chicago, Ill., large producer of concrete aggregates, crushed stone and lime, is adding a new twin screw pusher-type towboat to its fleet of cargo ships. The vessel, which has been under construction at Sturgeon Bay Shipbuilding and Dry Dock Co., Sturgeon Bay, Wis., was designed by David R. DeLay and Walter R. Plambeck, chief and assistant chief engineers of the Sturgeon Bay company, and incorporates ideas of Arnold Sobel, manager, Marine Division, and Melvin Hulett, port captain, Material Service Corp.

When completed and put into operation, this towboat will be the most powerful and maneuverable of the vessels with elevating pilot houses, designed specifically for operation under Chicago's fixed bridges and in the Calumet Sag Channel.



Profile and plan drawings of Material Service Corp.'s new river towboat

Designed to push eight loaded barges of 1400 tons each, the towboat will be powered by two Nordberg Suprathermal diesel engines which are each of the 4-cycle, heavy-duty, direct reversing, marine type, with six cylinders of 13-in. bore and 16½-in. stroke. These engines were selected by Material Service Corp. because of several design advantages they are said to have over conventionally turbocharged diesel propulsion engines. Employing the Miller system of supercharging, these engines operate at 160 lb. b.m.e.p., which results in one-third more horsepower. Thus the engines produce substantially more horsepower in a limited space.

The towboat is designed with a modified V-type, electric-welded steel hull, 103 ft. in length, 30 ft. in beam and 10 ft. 9 in. in molded depth. The normal draft is 7 ft. 6 in., loaded. Fuel oil storage capacity is 31,500 gal.; potable water, 10,000 gal.; and filtered water, 1300 gal. Water for engine make-up will be drawn from the potable water supply.

Because of the close clearances in

which the vessel will operate, it is being built with a high degree of maneuverability. Two independently connected hydraulic steering gears, one for the four flanking rudders and the other for two steering rudders, will be installed and controlled from the pilot house. The elevating pilot house is mounted on a hydraulic ram with controls in the pilot house adjacent to the steering stand. When the pilot house is in a raised position, the towboat will have a clearance line above the water of 21 ft. 9 in.; when lowered, 13 ft. 9 in.

The towboat is scheduled for delivery sometime this month and christening ceremonies will be held at one of Material Service Corp.'s Chicago docks.

## Canadian Asbestos

PRELIMINARY ESTIMATES of asbestos production in Canada in 1951 placed it at 967,375 short tons, valued at \$78,792,067, as reported in *Mineral Trade Notes*, Bureau of Mines. This is an increase of 14 percent over the 1950 output of 875,344 tons. The rise was attributed to increased production of the non-spinning grades.

Quebec province produces about 97 percent of the national output of asbestos, with the remaining 3 percent coming from the Munroe mine near Matheson, Ont., which was brought into operation by Johns-Manville Co., Ltd., early in 1950. Output in Quebec is from the eastern townships where asbestos has been mined since 1878. Reserves are expected to last for at least another 150 years of operation.

There are seven producing companies in Quebec, which, in order of size of output, are: Canadian Johns-Manville Co., Ltd.; Asbestos Corp., Ltd.; Johnson's Co.; Quebec Asbestos Corp.; Bell Asbestos Mines, Ltd.; Nicolet Asbestos Mines, Ltd.; and Flintkote Mines, Ltd.

## Rock Phosphate Plant

RUHM PHOSPHATE & CHEMICAL CO., Columbia, Tenn., recently began operation of its new raw-ground rock phosphate plant, located on a 35-acre site formerly occupied by Franklin Limestone Co., as reported by *Engineering and Mining Journal*. The new plant is owned by Oliver M. Babcock, formerly of Hoover & Mason Phosphate Co. of Mt. Pleasant.

## Pavement Yardage

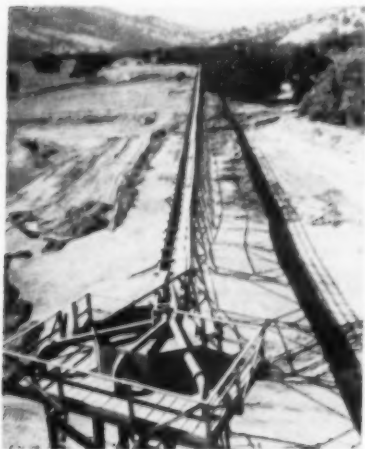
AWARDS OF CONCRETE PAVEMENT for the month of March and for the first three months of 1952 are listed by the Portland Cement Association as follows:

	Sq. yd. awarded	
	During March 1952	During first three months 1952
Roads .....	3,289,348	5,773,932
Streets and alleys .....	1,694,901	4,926,814
Airports .....	426,525	1,926,536
Totals .....	5,410,774	12,627,276



## Tailing Control

AT A WESTERN OPERATION, all wash waters from the plant flow to a sump where three pumps are available to pick up the pulp and discharge it to



Flume carries sand slimes to settling basin

a long launder as shown in the illustration. The flume carries the muddy water and finer sand slimes to the settling basin, allowing only clear water to be returned to the drainage

system. The accompanying illustration shows a substantial and well-built supporting trestle for the flume.

Periodic or spring floods cannot always be relied upon for keeping a river or navigable stream free of finer sand slimes which have been discharged into it. If the floods fail to materialize and a sand bar builds up as a result, clearing of the channel could prove much more costly than providing for an adequate tailing control system.

## Mixer Aids

WHEN A SMALL AMOUNT of a dry ingredient is to be mixed with a larger tonnage or volume of other materials, the mixer operator may sometimes become confused as to whether or not the additive has been added. This can result in duplication of the addition, or the elimination of it altogether. One solution to this problem is the use of a tilting holder-receptacle. When the pan of such a device is filled, it trips a mechanical device (or series of such devices) in such a manner that (1) the mixer outlet gate must be properly closed; (2) the mixer must be filled (or filling) with the main ingredient; and (3) all related functions of the mixing operation must be in proper relation to each other.



Series of tilting pans, mounted on weigh hopper, increase accuracy of mixing operation

The illustration shows a weigh hopper serving a paddle-type mixer which holds about 2000 lb. of material. A series of tilting pans or holders are mounted on the weigh hopper so that several different ingredients may be added to the mix if desired. As each pan is loaded, it tips and closes an electrical contact, arranged so that the hopper cannot be dumped until all additives are in the tilting hopper. When the main hopper unloads, the material in the smaller hopper automatically dumps into the mixer at the same time. Also, before the main hopper can be dumped, the outlet gate to the mixer must be closed and the mixer must be empty, making duplication of additives almost impossible.

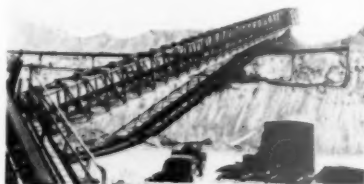
## Riprap Production

THE PRODUCTION OF RIPRAP continuously presents many problems. In some areas, riprap may weigh up to 10 or more tons. In other sections, plus 6-in. stone, to a size that can be lifted by an average laborer, is defined as riprap. Jettystone, "spalls," etc., are also locally used names for the larger sizes of stone. At the operation described here, the riprap is of a

minus 6-in. to around plus 10-in. size. The material is first crushed in a 42-x 50-in. Nordberg jaw crusher and then taken by belt conveyor to an Allis-Chalmers scalping screen. The oversize falls to a 6-in. spaced grizzly and the coarse fragments are conveyed to open gondola cars by means of a belt conveyor mounted on a boom. An attendant is stationed at the toe of the grizzly to keep his eye on the flow of the material and on related operating problems.



Conveyor, mounted on boom, delivers to gondola car



Radial stacker permits good sand drainage

## Stockpiling Finished Sand

AT A LARGE DAM under construction in the West, a radial stacker of the type shown in the illustration is used to stockpile the finished sand. Reclaiming belts operate in a tunnel under the pile. The gallery supporting the stacker belt is of the truss-type which permits its construction at ground level, after which the truss can be hoisted into place. The semi-circular supporting track at the outboard end is of steel construction, with the gallery pivoted at its lower end. The unit is power driven. By use of this type of sand-storage builder, the sand can drain a minimum of 72 hr. before using.



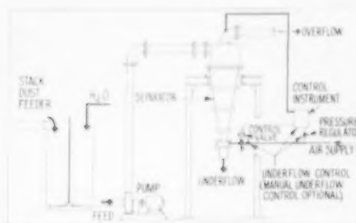
## HINTS AND HELPS

### Treatment of Stack Dusts

THE REMOVAL of a small amount of finely divided solids from a relatively large amount of liquids, as developed in the mining industry and in the rock products industries, opens up a wide and new avenue of approach to many current-day operating problems. This separation process is centered around the so-called DorrClones, Whirlcones, Centriclones and similar devices wherein the pulp is pumped into a cyclonic-type vessel and maintained there under pressures in the 10- to 25-p.s.i. range. The centrifugal action causes a separation that is surprising in its scope. Pressure is maintained in one such device, as shown in the line cut, by a regulator developed by The Foxboro Co.

It is well known to the portland cement industry that the finer stack dusts from rotary kilns may contain a relatively large alkali content (sodium and potassium salts, mainly in the hydroxide form) and that if this dust is returned into the kilns the alkali content of the finished portland cement might be raised above a desirable figure. It is also well known that the alkali hydroxides are readily soluble in water.

On this thesis we are suggesting that stack dusts might be rapidly and quickly mixed with relatively large volumes of water (preferably warm water) pumped into one of these "clones." The underflow can be adjusted to give solids in the 70- to 72-percent range with some sand-slime mixtures. The overflow containing the bulk of the soluble alkalis could be wasted. The sectionalized construction of the unit shown would permit occasional (and easy) cleaning out of incrustations which may build up, although this is unlikely as the centrifugal action within is of such magnitude that incrustations should not form. The process could be a continuous one, in which event the mixing tank, pump assembly, etc., should be as close to the "clone" as compatible with the solubility of the alkali salts. One engi-

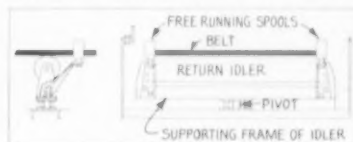


Stack dust from cement kilns might be recovered in centrifugal-type separation vessels

neer has suggested that addition of a small amount of sugar to the pulp stream would inhibit any setting action and that any sugar entrained in the underflow would be destroyed in the calcination.

### Self-Aligning Idlers

AS MOST BELT CONVEYOR operators know, the greatest point of wear on most belt conveyors is at the edges and is due to the belt rubbing against something instead of running free and clear. Self-aligning idlers can play an important role in preventing belt destruction. Those shown in the



Line drawing of idler construction

illustrations were on a long flat-running belt. One illustration is of the carrier idler and the other is of the return belt idler. The principles involved in their manufacture are the same and the line drawing gives the essentials. The supporting frame of the complete set of idlers is pivoted near its center. At the outer ends of this frame are two upright arms to which are affixed free-running spools which engage the edge of the belt. This contact causes the assembly of idlers to swing in the proper direction so as to help bring the belt back into line.



Shake-out installation, using a hand-winch arrangement, speeds unloading of aggregates

### Shake-Out Mounting

AT A LARGE CONSTRUCTION JOB in the Missouri Valley area, aggregates are delivered from distant sources to the construction site and unloaded to conventional track hoppers. To expedite rapid unloading of the aggregates, a Robins shake-out has been installed as shown in the illustration. The shake-out is a device that is placed on the rim of the car and, through an unbalanced pulley and drive arrangement, the car is vibrated and shaken, resulting in a more rapid flow of materials (wet sand here) from the car to the track hopper.

At one operation observed, an expensive crane was assigned to handle the shake-out and, at another installation, a rather costly power winch arrangement was used. At the installation discussed here, an inexpensive hand-winch, mounted on the rear column, is used to make a simple and inexpensive arrangement. However, to meet safety requirements in some states, it might be necessary to provide for more clearance between the supporting column and the car.



Left: Self-aligning carrier roll. Right: Self-aligning return roll

# NEW

# Machinery



## Multiwall Bags

NATIONAL WATERPROOF PAPERS, Inc., Front & Beckett Sts., Camden 3, N.J., is producing a complete line of crinkled kraft multiwall bags, in addition to its regular line of creped shipping and packing materials. This type of bag, which the company produces in two to six plies, is said to be a strong, easy-to-handle container for bulk shipment of mineral concentrates, numerous chemicals, fertilizers, etc. The product's name is Tuf-pak, and it can be made into bags in any size up to 36 in. wide, with a maximum of 44 in. for some applications.

## Belt Trainer

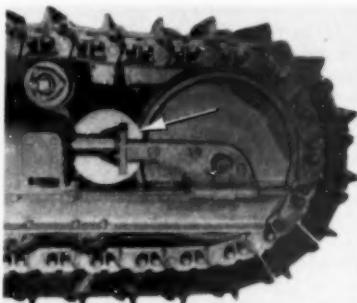
THE RAPIDS-STANDARD CO., INC., 342 Rapistan Building, Grand Rapids 2, Mich., is now manufacturing a positive-action belt trainer that is said to automatically keep wandering conveyor belts aligned. The trainer can be installed on any make of conveyor which has the return belt exposed beneath the bed. It is designed for use on fabric or rubber-covered belts  $\frac{3}{4}$  in. or more thick, operating at speeds up to 200 f.p.m.

In use the trainer is bolted to the flanged rails on the underside of the conveyor. Flat sides of the belt run between two sets of knurled spring loaded rollers, with the belt edges contacting two sets of equalizer posts. If the belt creeps to either side, it

presses against the equalizer posts and cocks the spring-loaded knurled rolls to the new belt direction. This forces the belt back into alignment and the trainer mechanism returns to normal setting.

## Hydraulic Track Adjuster

MACHINERY PARTS SALES CORP., P.O. Box 7682, Dallas, Texas, has announced availability of the Hydrajust-



Hydraulic track adjuster for crawler tractors

er, a patented hydraulic track adjuster for all models of Allis-Chalmers, Caterpillar and International crawler tractors. It is said that the adjuster eliminates the time-consuming task of manually adjusting the track with adjusting screw and nut. Installation of the adjuster can be made in the field; once the tracks have been broken, it can be installed in about 1½ hr.

## 1952 Truck Line

FORD MOTOR CO., P.O. Box 638, Dearborn, Mich., has announced its



Truck chassis designed for heavy-duty hauling truck line for 1952, which is said to offer a wide range of engines and power combinations. The line introduces a new sedan-delivery model, known as the Courier, and offers five engines, including three new high-compression, low-friction overhead valve units. All regular truck units are available with 5-Star cabs or with 5-Star Extra cabs. All Ford truck engines feature the Power Pilot carburetion-ignition system, aluminum autothermic expansion control pistons, full-pressure lubrication, free-turn valves, and alloy crankshafts, camshafts and exhaust valves.

## Heavy-Duty Lubricant

KNAPP MILLS, INC., 23-17 Borden Ave., Long Island City 1, N.Y., has developed a heavy-duty grease lubricant, known as Lead-Lube, which has an extremely high metallic lead content in the form of pulverized lead dust, kept in suspension by the Knapp process. The function of the metallic lead in the lubricant is to form self-lubricating surfaces over the wearing parts of gears and bearings. In the case of older equipment, it is said that the metallic lead will re-surface pits and scores. It is claimed that applications of Lead-Lube will also increase the life of machinery exposed to corrosive conditions.

## Crawler Crane

AMERICAN HOIST & DERRICK CO., St. Paul 1, Minn., has in production a  $\frac{3}{4}$ -cu. yd. crawler crane, available with a choice of fronts—crane, shovel, dragline or pull shovel. This unit, called the Model 375 BC, falls in the heavy-duty 45,000-lb. class. Track pads are double-walled, special steel castings with full length pins. The company reports that a high-speed boom hoist with controlled lowering arrangement is standard equipment, and that boom radius may be changed with perfect control and without danger of dropping the boom.



Three-quarter-cu. yd. crawler crane

### Stockpile-Windrow Loader

ATHEY PRODUCTS CORP., 5631 W. 65th St., Chicago 38, Ill., has in production a stockpile-windrow loader, known as the Athey Force-Feed Hi-Loader. Features include a full-floating feeder suspended from two coil springs and a pivot, allowing the paddle blades to "float" over the contours of the windrow; and a new auger gather-feeder, said to speed up loading from stockpiles and windrows. The 30-in. conveyor belt is cleated to handle a variety of materials, and the conveyor can be directed 45 deg. right or left of center, being hydraulically controlled from the operator's seat. Loading speeds range through four gears from 0.3 to 1.92 m.p.h.



Loader with 30-in. conveyor belt

### Pyrometer Controller

WHEELCO INSTRUMENT CO., 847 West Harrison St., Chicago 7, Ill., has announced a compact, direct reading, indicating pyrometer controller incorporating a built-in unit to provide straight-line control, the Model 293 Capacitrol.



Direct reading, indicating pyrometer controller

The instrument operates with the same Wheelco "electronic link" incorporated in the company's line of controllers, but adds the new Line-otrol feature said to automatically reduce to a minimum the "on" and "off" variation of the control instrument above and below the preset control point.

The controller uses the same measuring system with Alnico V magnet and control assembly utilized in its predecessor, Model 292. The unit measures 7 5/8 in. wide x 8 1/4 in. high x 7 1/2 in. deep. A wide range of standard scales in various thermocouple calibrations is available.

Capacitrol features such as thermocouple break protection, interchangeable voltage selective plugs, front accessibility, and plug-in terminal panel have been retained in the new controller.

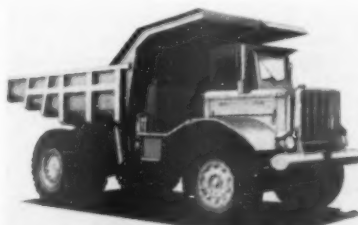
### Oiling System

OIL-RITE CORP., 2318 Waldo Blvd., Manitowoc, Wis., has developed Electro-Oiling System Style DEI, which is

a single-line gravity feed system, automatic in operation. It consists of a central reservoir with a solenoid-operated shut-off valve and a number of individual valves mounted directly into the bearings. Copper tubing connects the reservoir and all valves in series in such a manner that gravity flow will be maintained. It is said that a single reservoir will feed up to 24 bearings, thus replacing individual oilers.

### End-Dump Truck

KENWORTH MOTOR TRUCK CORP., Seattle, Wash., has begun production of its new heavy-duty, end-dump Model 801 Earth Mover. Payload capacity of the truck is 30,000 lb.; struck meas-



Heavy-duty end-dump truck

ure capacity is 9.9 cu. yd., with heaped load at 11.9 cu. yd. The oversize-tired unit has a full anti-friction bearing mounted, power assisted steering gear and offset cab.

### Automatic Sampler

THE GALIGHIER CO., 545 West Eighth South St., Salt Lake City 4, Utah, has added a short-stroke sampler, the Galighier Junior sampler, to its line of Geary-Jennings automatic sampling machines. The unit cuts the stream of material at right angles at a designated uniform rate of speed at predetermined intervals, said to assure equal percentages from all parts of the cross section. The 12-in. stroke machine is designed to be used where there is limited headroom.

### Portable Air Compressor

GARDNER-DENVER CO., Quincy, Ill., has announced a 600-c.f.m. portable air compressor, the Gardner-Denver 600. The compressor operates at 1200 r.p.m. and is designed with large valve areas and large radius air passages; the engine is said to provide reserve power at moderate operating speeds. The unit is a two-stage machine, with water-cooled compressor cylinders. A rugged undercarriage is said to provide the stamina required for moving the unit over rough terrain.

### Speed Reducer

DODGE MANUFACTURING CORP., Mishawaka, Ind., has announced a double reduction shaft-mounted speed reducer with capacity to 43 hp., and for output speeds from 12 to 110 r.p.m. Like previous Dodge models, the No. 7 reducer is shaft-mounted and anchored with a torque arm which fastens to any fixed object.



Shaft-mounted speed reducer attached to head pulley of belt conveyor; anchoring arm is equipped with an overload release



Material is delivered to a hopper that feeds a rotary scrubber-screen (center). Sand and water from the rotary screen is split to two sets of twin classifiers set back to back, (two of them in foreground). Sand from the classifiers falls to an inclined belt that delivers to a shuttle conveyor over the stockpiles (background). Overflow from the screw classifiers is collected in a settling tank; pulp from the bottom of the tank is then pumped to the cone separators for separation from the slimes and water.

**A**LMOST \$2 BILLION has been earmarked for the large H-bomb project that is now well into the construction stage in the Kathwood, S.C., area, about 20 miles south of Augusta, Ga. It involves the development of an area of about 20 x 20 miles.

Carolina Aggregates, Inc., is one of several aggregate producing companies which has built a new plant to serve the large market made available by the atomic energy program. The company is associated with Becker County Sand and Gravel Co., the main office of which is in Crosby, Minn., but with a regional office in Cheraw, S.C. The Southern division of the company covers plants at Camden, Kathwood and Cheraw, in South Carolina, and plants at Fayetteville and Marion in North Carolina. In Minnesota the company has several aggregate operations. The new plant at Kathwood is designed to recover sand, primarily, although the deposit does yield some small size gravel. The gravel was being stockpiled at the time of inspection and plans were being made to install facilities to scrub and screen the gravel for commercial uses.

The plant is quite simple but a description of it is quite timely, for in it are five Cottrell Engineering Co. "Whirlcones." This type of cone was the basis of a paper at the 1952 meeting of the National Sand and Gravel Association in Chicago, where E. A. Goodman, Jr., gave an account of his experiences with it at the Lessees of B. V. Hedrick Gravel and Sand Co.'s plant at Lilesville, N.C. (see *ROCK PRODUCTS*, March, 1952, page 102).

# Recovering Fine Sand Particles

**Carolina Aggregates, Inc., uses centrifugal-type cone to separate sand from slimes for return into plant flow**

**By WALTER B. LENHART**

The first Whirlcone to go into a sand and gravel plant was at the Caudell & Johnson operation at San Diego, Calif. In the August, 1950, issue of *ROCK PRODUCTS*, page 108, we described its functions there. The first installation east of the Mississippi river was at the Lilesville operation.

## Cone Operation

The Whirlcone resembles a small conical dust collector. Pulp is pumped into the unit and by centrifugal action within the cone, fine sand can be separated from slimes and water. The units are of welded steel construction. At the Carolina Aggregates' operation they are 25 in. in diameter; over-all length is about 4 ft.

Pulp is pumped tangentially into the collector and the sands are ejected through a valve at the lower apex of the cone. The slimes flow out through a vertical pipe that extends through a gland at the top of the

unit. Some control of fineness can be obtained by raising and lowering this vertical pipe. The inlet pressure of the pulp is the governing factor of the extent of the centrifugal action. The higher this pressure the more intense the swirling action, and the more solids that accumulate at the periphery. The outlet is controlled by a molasses-type valve. At the Kathwood operation an inlet pressure of 25 p.s.i. is maintained. Each cone is served by a 4-in. Georgia Iron Works slurry pump directly connected to its drive motor.

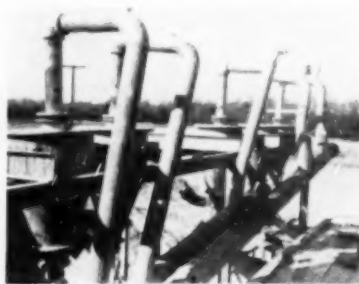
Material going to the Whirlcones is the overflow from the main sand recovery system to be described later.

Material requirements in the area are standard A.S.T.M. specifications for concrete sand, which requires 10 to 30 percent passing a 50-mesh sieve and 2 to 10 percent passing a 100-mesh sieve. The Whirlcones are intended to put more minus 50- and 100-mesh material into the plant-run sand and each cone is adding about 6 t.p.h. to the hourly output. The pumps each handle about 700 g.p.m. of pulp with a solids content between 5 to 6 percent. The solids vary considerably due to variations in the pit.

## Sand Recovery System

The flow of material in the plant is quite simple. Primary excavating is by means of a 12-in. Georgia Iron Works dredge pump driven by a 500-hp. motor at 2300 volts.

Material is delivered through a 12-in. Armco steel pipeline to a hopper that feeds a 6- x 24-ft. Lippmann rotary scrubber-screen. The inner barrel of the rotary screen has progress-



Vertical pipes on the cones carry the slimes. By raising or lowering this pipe, some control of fineness of the discharge can be obtained. Sand is ejected through a valve at the lower apex of the cone.





Panorama of the Kathwood, South Carolina plant of Carolina Aggregates, Inc.

ively  $\frac{1}{2}$ -in. and  $1\frac{1}{4}$ -in. openings and the outer wire is  $\frac{1}{2} \times \frac{1}{2}$  in. followed by  $\frac{3}{8} \times \frac{3}{4}$  in. The oversize is carried by belt conveyor to a large storage pile and will be available for later processing when the gravel treating plant is installed. The sand and water from the rotary screen is split to two sets of two 36-in. twin Eagle sand classifiers set back to back. The sand from the classifiers falls to a 36-in. inclined belt that delivers to a 60-ft. shuttle (30 in. wide) over the stockpiles. The overflow from the Eagles is collected in a large settling tank and the five G.I.W. pumps pick up the pulp from the bottom of the settling tank and pump it to the Whirlcones. The excess water from the settling tanks is flumed to waste. The sand collected in the cones joins that from the screw classifiers and falls to the 36-in. belt. The plant is recovering about 250 t.p.h. of sand.

The dredge has a 12-in. suction pipe that is flared to 24 in. at its outboard end. Five jets are provided, four around the perimeter of the suction and one in the center. Fresh water at 130 to 140 p.s.i. is pumped through these jets. This pressure will not cut through the clay in the bottom of the deposit so it helps keep some of that undesirable material out of the plant. All material is handled by conveyor belts which ride on Continental Gin Co. idlers.

Reclaiming from storage over a tunnel is by clam-type, hand-operated gates, onto a 36-in. belt conveyor. Facilities are available for both car and truck loading. The plant is served by the Charleston and Western Carolina railroad. Truck shipments are weighed on a Winslow truck scale.

#### Personnel

E. A. Mullen is president of Carolina Aggregates, Inc., and is also vice-president of Becker County Sand and Gravel Co. M. C. Evans is secretary and general manager and W. E. Williams is treasurer; Roy Stevens is chief clerk. All of the above have headquarters at Cheraw, S.C. Personnel at Kathwood, S.C., include B. F. Smith, superintendent; W. C. Revis, foreman; and F. B. Varner, office manager.



Centrifugal sand separators are used at Carolina Aggregates, Inc., Kathwood, S.C., plant. The cones are located above the two sets of screw classifiers. A rotary scrubber-screen is behind the cones, with its feed hopper at left

#### Tennessee Barite Deposits

BARITE DEPOSITS and geology of the southeastern part of Cocke county, Tenn., are described in a recent report, "Geology and Barite Deposits of the Del Rio District, Cocke County, Tenn.," published by the Division of Geology, State of Tennessee, Nashville. The Del Rio district has produced about 55,000 tons of barite and at least four times this amount is indicated by reserves. Since 1880, 12 mines and five major prospects have been opened.

The principal barite deposits are localized along two prominent faults. One of these, the Hot Springs thrust, is one of the major faults of the Appalachians; the other is a bedding fault which occurs beneath a prominent coarse-grained quartzite bed. A few small scattered showings of barite occur on or near branching faults but are too small to encourage prospecting.

The high grade and comparatively small barite deposits of the district are found along the bedding plane fault. The overlying quartzite bed is about 50 ft. thick.

The report states that a study of the geology and deposits indicates that

most of the barite deposits in the district do not merit further prospecting at present.

Other mineral deposits in the district include kaolin, limonite, manganese oxides and building stone. Of these, only the building stone quarry is in operation.

#### Diamond Bits Investigated

SINCE THE VARIOUS crystal surfaces of diamonds differ in hardness, the Bureau of Mines is conducting a long-range series of experiments in which the effects of various orientations of drill bort set in the crowns of diamond bits are being investigated.

Preliminary experiments completed to date and reported in Bureau of Mines Report of Investigations 4800, "Diamond Orientation in Diamond Bits—Procedures and Preliminary Results," by Albert E. Long, indicate that a substantial saving in diamonds may be effected by using the harder areas of the diamonds as working surfaces in the crown of diamond bits. Results indicate that by proper orientation of diamonds in the bits, drilling performance of the bit is increased and the diamond loss per unit of work performed is greatly reduced.

# DEVELOPMENTS IN INDUSTRIES IN

By F. O. ANDEREGG\*

THESE ARTICLES on developments in Europe were written by Dr. F. O. Anderegg at ROCK PRODUCTS' special request. Dr. Anderegg went to Europe last fall to attend the First Building Research Congress in London and visited a number of countries for a study of new ideas and practices with emphasis on improvement of quality in nonmetallic building materials. His observations are published here and the bulk of the CONCRETE PRODUCTS section of this issue summarizes his appraisal of developments in precast concrete in Europe. Dr. Anderegg has long been identified with the John B. Pierce Foundation and is now a consulting specialist on building materials. He continues on ROCK PRODUCTS' staff as a contributing editor.

THE EDITORS

THE GREAT BUILDING activity in Stockholm and rebuilding in Germany and in Milan left outstanding impressions. In Germany the problem of disposal of the rubble left from the bombing and its recovery for new building speaks well for the industry of the Germans. In England a man is not permitted to build himself a chicken coop, while in Germany he can not only buy a prefabricated house, but can also accomplish a large part of the erecting work himself. Activities in these two countries seem to respond to such relative restrictions.

In Stockholm, living space per person has doubled since the war, giving a tremendous impetus to the development of gas concrete units and to very interesting improvements in stuccoing technique, where actually a 1:2:15 mortar is used after passing through a high speed mixer.

In Germany strength requirements

\*Consulting specialist on building materials, Somerville, N.J.

## Postwar progress in operating methods and in building materials development summarized with emphasis on quality

for masonry walls have been reduced for the rebuilding emergency. They do not insist on safety factors in compression as high as 25 to 50 as some authorities insist on in this country. A great deal of "no-fines" concrete is being placed in that country, using aggregate reclaimed from the rubble.

The people encountered, especially in England and Germany, seemed unusually friendly, very little of the hostility encountered on previous trips being apparent. The same was true in the smaller countries visited. Tech-

nical personnel were keenly interested in technical developments in this country, but generally seemed to feel such developments could only flourish under American conditions.

Nearly everywhere, the benefits of the Marshall plan are evident. Even countries like Sweden and Switzerland have profited considerably in expanded markets as a result of the program. Most of the Germans with whom I talked were very appreciative of this plan, and of the CARE packages they received immediately after the war when food was so scarce.

## Building Research Congress Held in London

THE FIRST BUILDING Research Congress, held in London, England, last September, was organized by members of the Building Research Station and other British government bureaus. No pains were spared in doing a very thorough job of organizing. A considerable number of papers were contributed by European neighbors, while Canada and Australia made a good showing. The United States was not well represented either in papers presented or in attendance. The main papers were preprinted and circulated in time to permit study and preparation of the discussion.†

The papers were divided into three groups. The first group dealt with such topics as new building methods and prefabrication; research and concrete design; steel use as affected by research; modern developments in timber and light alloy construction, and there was a whole set of papers on soil studies and foundation construction.

The second division dealt with building materials. After a general paper on trends in research, the effect of weathering in various climates was considered. The different materials, burned clay products, cement and con-

crete, stone and lime, paint and plasters, and timber technology were given consideration.

In the third division, acoustics, heating, ventilating and lighting were discussed in reference to different climates and to different types of buildings, such as hospitals, factories and schools.

In discussing the paper on prestressed concrete, the question was raised regarding fire protection. With the reinforcing steel embedded in concrete having a high degree of compaction and high thermal conductivity, there is considerable danger that in case of fire a prestressed member may fail readily. The answer, of course, would lie in the addition of a suitable amount of lightweight concrete for fire protection.

The papers on weathering research stimulated a great deal of discussion, in which a great variety of views was presented. There seems to be an ever growing consciousness of the role played by efflorescent disintegration in causing deterioration of building materials.

In the symposium on cement and concrete, R. F. Blanks (Ideal Cement Co.) discussed concrete quality control, while H. F. Gonnerman (Portland Cement Association) presented the results of the Naperville and

†This discussion is being printed and will be available for 20 shillings at the Building Research Station, Garston, Watford, Herts.

# ROCK PRODUCTS AND CONCRETE EUROPE

other concrete durability studies in this country. The paper by T. Whittaker on lightweight concrete roused a great deal of discussion. Most people seem to appreciate the benefits that can be obtained from lightweight building materials.

Building stone were discussed by French and British experts. The most magnificent stone work to be seen anywhere is probably in Rome and a paper giving some of the historical

aspects involved would be of great interest.

Three South Africans, Sutterheim, Webb and Uranovsky, presented a paper on burning and hydration of lime. They point out that the fluidized bed and other modern methods are effecting better temperature control, thermal efficiency and heat distribution. The lowest economic temperature of calcination is desirable because of the improvement in plasticity in the

hydrated product. The pressure hydration of magnesium lime gives sound lime. However, it was stated that, "the presence of unhydrated magnesia in lime does not necessarily cause expansion, and no satisfactory correlation appears to have been established between unsoundness tests and the behavior of the material in practice." More work needs to be done in this field.

## Aggregate

### RUBBLE FROM BOMBING CONVERTED INTO AGGREGATE FOR REBUILDING GERMANY

THE BOMBING of various European cities left tremendous quantities of rubble to be disposed of before traffic could be resumed and rebuilding could be started. The problem of where to dump all this waste has been acute around many of the cities. For instance, Dusseldorf is encircled by a dozen small mountains formed by dumping this rubble. Around Frankfurt there was, however, no adequate place for dumping, and so the engineers got together and worked out a plant for "Trummerverswertung" which is similar to that used in other German cities.

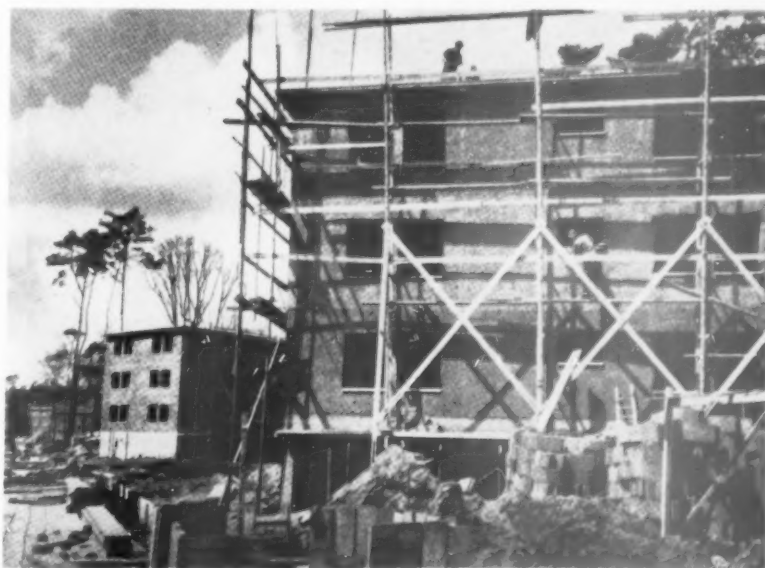
The city of Frankfurt am Main has probably as elaborate a set-up as any. Since no place could be found to dispose of all the rubble, the city set out to recover it for rebuilding purposes. Power shovels load it into trucks in which it is taken to a large plant and dumped through a grizzly. The rubble then passes along a belt conveyor where trash is removed. The good brick are placed in a separate pile for reuse. The remainder are passed through crushing equipment including a pendulum mill and suitable rolls. The product is then screened and dropped into a series of hoppers from which it may be loaded into trucks.

The very finest material is mixed with a little coal slack and run into a Lurgi sintering grate. In this way

sintering takes place and an aggregate is produced much like Haydite. This whole operation is highly mechanized, and the plant represents an investment of more than \$2,000,000. The city has underwritten the bulk of the costs through Marshall plan aid, but certain private companies are

also partners, including the Lurgi Co. and a construction firm which drew up the plans. In some of the cities the crushing equipment is leased to the city. These installations are intended for about 15 years of activity.

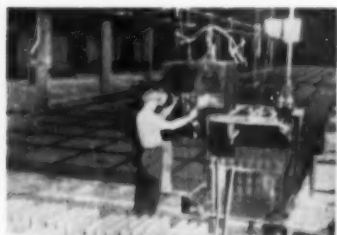
All plastering in Frankfurt was with lime so that all of the fines could



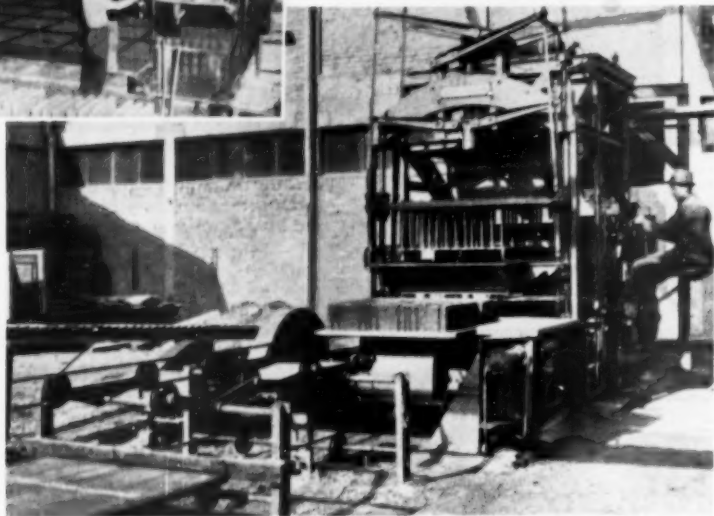
Houses built of no-fines concrete made from rubble aggregate



## EUROPEAN DEVELOPMENTS



Below: Automatic German block machine. The pallets are carried away by the cables to the storage yard. Inset: After removing the pallets from the cables, they are stored and later transferred to large piles



be safely sintered into aggregate. In Stuttgart, however, gypsum plastering was the rule, so that not only was it necessary to discard the fines, but it was also important to see that the brick aggregates should not contain more than about 1 percent gypsum. This is accomplished by taking samples at intervals and checking them in a small laboratory on the grounds. The fines in this case are dumped in any one of a number of abandoned quarries in the locality.

In Frankfurt a large block plant is located on the grounds of the rubble

recovery plant. Here a mixture of about  $\frac{1}{4}$ - to  $\frac{1}{2}$ -in. crushed brick aggregate, with some finer material which had been retained on a 20-mesh screen, is mixed with a suitable amount of bulk cement and water in a series of countercurrent pan mixers, similar to Lancaster mixers. This type of mixer is pretty generally used on the Continent for mixing the dry type of mixes for concrete products. The damp mix is then fed to an automatic Schlosser block machine. This is run by one operator, the block being supported on wooden pallets and car-

ried to the yard by a cable. In the yard the block are removed from the cables and allowed to stand till they set hard enough to handle. Then they are stripped from the pallets and are stored in outside piles, preferably for at least three months.

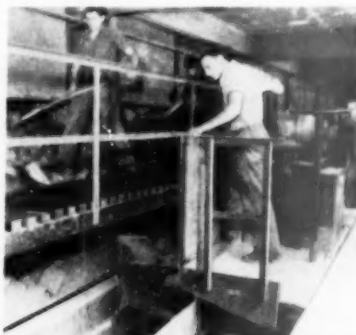
Other block manufacturers buy part of the aggregate, while much of the aggregate in the two larger sizes,  $\frac{1}{4}$  to  $\frac{3}{4}$  and  $\frac{3}{4}$  to about  $\frac{1}{2}$  in., is delivered to the building site for placing no-fines concrete in forms. This type of concrete is being built by the square mile.

### No-Fines Concrete

One complaint frequently encountered about no-fines concrete (*Schutt-beton*) is that sound deadening is hardly adequate. The forms may be of steel where a sufficient volume of construction warrants their use. However, sometimes the forms are made of boards which may be used a dozen or more times by careful handling. These walls are finished by coating inside and out with a high lime mortar, as is reported elsewhere in this section.

These utilization plants are a fine expression of German ability, industry and technical control. The American taxpayer has also made a not too inconsiderable contribution to this rebuilding through the Marshall plan.

The German technical authorities, their advisors and others interested got together soon after the war and work-



Rubble is placed on a conveyor from which iron and similar materials are removed



Rubble being dumped at the central recovery plant in Frankfurt, Germany

ed out specifications for this no-fines concrete. They also, in view of the urgency of the situation, have changed the compressive strength requirements of masonry walls to give a better balance between performance requirements and compressive strength. In other words, they do not demand a factor of safety of from 25 to 30, but have tried to rationalize the requirements by considering probable eccentricities of loading. In view of the conservative character of engineers, such a change in viewpoint marks a milestone. It might well be emulated by some of the code authorities in this country



# Lime-Sand Stuccos in Europe

**Cement proportion held low in lime mixes for flexibility of surface. Underburned lime with some core gives best results**

**O**VER A CONSIDERABLE part of Europe it is customary to build most of the industrial structures, office buildings and houses of rather rough masonry. This is generally unit masonry but more recently in Germany no-fines concrete made from rubble aggregate has been used extensively. All of these walls are then smoothed both inside and outside with a coat of stucco or "rendering." Frequently the cheapest materials are chosen for this purpose, mostly a lime binder with local sand. In some localities walls are expected to be gone over about every five years for such repairs as are necessary. In many parts of Europe the severity of the weather does not compare with that in the northern part of the United States, and at least fair results can be achieved in this way. However, so many of the outer walls have such a depressingly drab appearance that it would seem that more effort might be given to improve their esthetics.

In addition to ordinary high calcium lime, whether a hydrate or a soaked quick lime, a considerable amount of hydraulic lime is available for improving stucco quality. It is common practice to underburn this lime. For instance, several of the portland cement plants operate on a stone containing varying amounts of clay. Often this stone is a marl. Certain sizes of stone are sorted out in the quarry and are mechanically introduced into shaft kilns with a small amount of coal. Many of the kilns are also equipped with automatic discharge grates. Only enough coal is added to calcine about three-fourths of the stone. In addition to fuel economy, the soft burned lime, together with the core when finely ground, produces a product of excellent workability. A similar type of burning might well be adopted in this country for producing building limes.

In many other places, however, it is more convenient to add a little portland cement to secure better durability. Seldom is more than one part of portland cement used to two parts of lime. Along this line, a very extensive study has been made in Sweden by an engineer, A. Nycander. The author spent several days with him carefully studying the results of his efforts. He kept repeating over and over, "You must use a mixture composed of one

volume of portland cement, two volumes of lime, and 15 volumes of sand. If you use more cement you will get cracking and if you use less sand you will also get cracking."

Now, he happens to have a remarkably well graded glacial sand to work with and such a ratio of sand can be carried by his soft-burned, high-calcium hydrate to which a little cement has been added. The author had demonstrated 20 years ago that sand can be graded to permit such high ratios and with excellent results. But very few places are blessed with such sand. Incidentally, the presence of a suitable amount of fines in the sand is an important factor.

In addition, Mr. Nycander has developed a high speed mortar mixer which is operated in a central mixing plant to produce almost all the mortar used in Stockholm, whether for stucco or for masonry. For much of the latter a straight lime mortar is used, especially for non-loadbearing masonry walls. The central mixing plant is located on one of the numerous waterways which split Stockholm into many parts. The sand is brought in by barge, recovered by clamshell to a hopper and from there is run into one of two horizontal continuous mixers about 20 ft. long, together with the necessary lime, cement and water.

The paddles are at right angles to the horizontal shaft, which turns at about 200 r.p.m. The mortar then flows into a shorter mixer, about 5 ft. long, where the speed is raised to 370 r.p.m. The result is an extremely well-mixed mortar, with the lime aggregations broken down so that the lime does not appreciably interfere with the packing of the sand. Some of the rough corners are knocked off the cement particles and even off the sand grains. The mortar is then placed in a dump truck and delivered anywhere in the city. This mortar can be used up to four hours. In winter the water is heated, of course.

In addition to observing the effect of the speed of mixing and of the mix proportions, Mr. Nycander has made careful strength determinations. For this purpose, a special tool has been developed by means of which the force

necessary to produce a faint indentation on the stucco surface on the actual wall can be measured. The results were uniformly higher with speed mixed mortar than when prepared in an ordinary mixer operating at about 40 r.p.m. Hand mixing gave still poorer results. Moreover, Mr. Nycander was able to show that the indentation resistance of his highly sanded mortars compared favorably with that of richer mortars mixed in other ways.

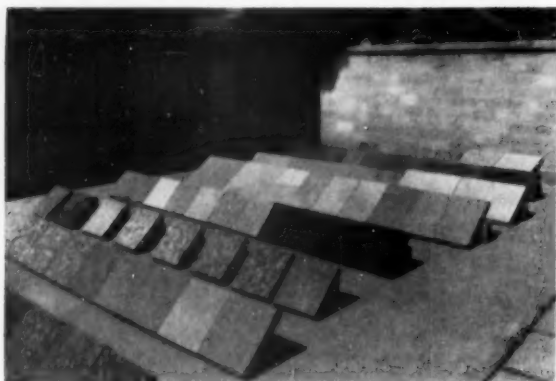
These results have now been backed up by many years of experience. Mr. Nycander has many outstanding jobs to show in Stockholm and in other parts of Sweden. He has been able to convince the Swedish specification authorities, after a tremendous effort, that he was right, so that Sweden is much farther ahead in this regard than any other country. Of course, it must be realized that few places seem to be blessed with such fine sand as is Sweden. However, glacial sands are available over considerable areas in the world, and in many other localities it would seem logical to duplicate the Swedish practice. The author feels that much can be done along this line. A high speed mixing machine has now been developed for trial under American construction conditions.

Some emphasis should be given to the method of applying stuccos. The priming coat used in Sweden, Switzerland and some other places is a soft cement grout, in about a 1:2 mix thrown on the surface of the masonry to form a mortar bond. Then the 1:2:15 mortar is carried in a pail and is thrown on to the surface to a depth of about  $\frac{3}{4}$  in. For this purpose the European masonry trowel with its fairly long goose neck is quite suitable. A darby operation is performed next, any excess being removed, but the aim is to prevent disturbing the mortar that is already in place. This throwing operation seems to be an important detail in securing good results. It also seems to give a more rapid coverage than with any spray operation suitable for such mortars observed by the author. After this coat has set, preferably for at least one week, a finish coat of quality mortar (*Edelputz*) may be applied.

In Europe a small spattering machine has been developed for this purpose. It holds about a quart of mortar and has a horizontal shaft rotated by

1. Anderregg, F. O., "Grading Aggregates; II. The Application of Mathematical Principles to Mortars," *Industrial and Engineering Chemistry*, vol. 23, page 1058 (1931).

## EUROPEAN DEVELOPMENTS



Experimental concrete surface finishes at Cement and Concrete Association laboratory in England

a small hand-turned crank. About eight flexible paddles are mounted on the shaft. Each picks up a small quantity of mortar and throws it onto the wall, leaving a stippled surface. White sand and lime are usually used, together with white cement and pigments, if desired. Generally, in Europe, plasterers prefer to use no cement in the finish coat. The surface coverage with this machine is quite rapid. Of course, several modifications of finishing suggest themselves, by means of which quite a variety of textures can be secured. For such a finish coat, the author prefers the Colorcrete gun, which is in use in this country.

In one large building project in Holland, precast concrete slabs were set in place by means of a crane. These were finished simply with one coat from this spattering machine. During this operation the windows and doors have to be shielded. Such a coat would not, of course, be expected to cover and hide the joints. Since the panels were fairly large, the visibility of the joints did not necessarily detract from the appearance. Other means had been used to keep water out of the joints.

Replies to a questionnaire sent by *Bauverlag* in Wiesbaden, Germany, had been received from 29 German cities concerning their stucco practices. These reflect, of course, the materials available in the different localities and also to some degree the severity of the weather. The usual mix is 1:3 with fairly fine local sand and hydraulic lime or cement-lime mixes; the more severe the exposure, the greater the amount of cement. The grading of the sand has been studied in a variety of places and many of the best results approximate closely those published 20 years ago by the author.<sup>1</sup> The proportions given are generally suitable for hand-mixed mortars. The stucco thickness is generally about 1 in., applied as a priming coat of grout, an undercoat about  $\frac{3}{4}$  in. thick, and a  $\frac{1}{4}$ -in. finish coat. The last may be thrown, sprayed or trowelled on and various final textures can be employed. Similar methods are used in Austria, Switzerland and Italy, as observed on this trip.

Since sand forms the major part of the stucco, it should receive some consideration. Experience has amply shown that fine loamy sands are very apt to cause cracking. A clean sand must be used. Sometimes, in order to get the dirt out, the sand is washed, whereby some of the finer sizes of good sand grains may also be removed. These fine grains act as ball bearings to improve workability and also tend to fill the smaller voids, when present in the proper small amounts. A slight excess may, however, cause trouble by interfering with the packing of the larger grains. Frequently, stone sands have given good results, because their superior grading may be more than offset by the greater irregularity in grain shape, as compared with certain natural sands.

The subject of stucco, or "rendering," has received careful study in England also, especially by the Cement and Concrete Association, 52 Grosvenor Gardens, London, S.W.1. Its recommendations are more or less intermediate between those employed on the Continent and American practices. The association rightly warns against permitting water to get into

the stucco from above and recommends overhanging eaves and appropriate flashings, drip-grooves, etc. The nature of the base must receive consideration in choosing the materials and methods to be used. These may vary all the way from very strong, dense surfaces to fiberboard. The association does not like to recommend strong, dense cement-sand mixes because of the danger of cracking. Water penetrates more easily through such cracks than even through an absorbent surface. The recommended cement-lime ratio ranges from 1:2 to 1:1.

The mixes generally run about one part of cementitious material to three of sand. A suitable key is necessary and to secure it, especially on very dense surfaces, a "spatter-dash" coat is recommended. It consists of one part of cement to 2 to 3 parts of fairly coarse sand, mixed to a thick slurry and thrown on the surface, which has been dampened in accordance with its suction. A thin, rough coat is so produced which should be left rough and then sprayed as soon as it has set. The straightening coat of high lime mortar is applied  $\frac{3}{8}$  to  $\frac{1}{2}$  in. thick, and when it has begun to dry out it should be scratched to afford a mechanical bond for the next coat, if applied by hand trowelling. Scratching is not necessary if the next coat is machine applied. This coat should dry out as long as possible before applying the final coat. This last coat may range from  $\frac{3}{8}$  to  $\frac{1}{2}$  in. thick and may be textured in any one of a large variety of ways, including pebbledash.

The Cement and Concrete Association has a large number of panels of stucco with exposed aggregate of a wide variety of origin, color and size. These are undergoing weathering at the research station northwest of London.

In England a very interesting new material and method has been developed for stuccos. A light frame is erected and covered with burlap or similar fabric stretched tight. Then a wire reinforcing mesh should also be stretched over the frame. The material to be used consists of portland cement mixed with three parts of clean, sharp sand in a high speed mixer, together with water and a foaming agent. The mortar is placed in a large container with a loose fitting metal sheet riding on the surface of the mortar inside the container. The top is fastened and air pressure at 15 p.s.i. is applied, forcing the mortar out of the bottom through a 1-in. hose to the spray nozzle, where about 15 cu. ft. of air per minute blows it against the burlap or other base. The dry mortar weighs about 80 lb. per cu. ft.

The rate of application depends upon the size of the equipment and may reach 1 c.f.m. or about 24 c.f.h., allowing for refilling. So far as pos-



Foamed concrete placed in this container can be lifted 100 ft. vertically by 15 p.s.i. pressure

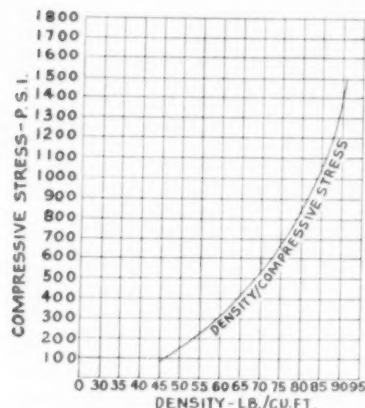
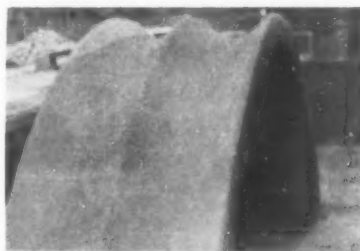


Fig. 1: Compressive strength of 3:1 sand-cement cellular concrete mixes at 28 days

sible, the work should be continuous. In this way it is not difficult to build up comparatively thin shells. Shells built up in this way have withstood several winters in London. This material seems to have interesting possibilities in milder climates.

Where it is desired to get superior insulation, the lightweight aggregates such as vermiculite or perlite can be used. Where waterproofness needs to be emphasized, a clay-type asphalt emulsion has proved helpful. Various fibers have been added to improve the tensile strength. The relation between density and compressive strength is given in Fig. 1, while Fig. 2 shows how the "k" factor varies with unit weight.

The difference between common American practice and that in Europe is that of two schools of philosophy.



Thin shells made by spraying foamed concrete on burlap

In this country we somehow feel that if we can just get enough portland cement into our mixes, they are bound to be very strong and durable. The European philosophy, on the other hand, seems to be to keep the mortar for unit masonry and for stuccos sufficiently flexible to take up the movements of the building that are constantly taking place. Europeans feel they get less leakage through about 1 in. of high lime mortar than occurs, for instance, through the cracks that were to develop in a very rigid surfacing. The author feels that an appropriate flexibility is a very desirable property to incorporate in our masonry structures.

Paint application to stuccos is full of dangers. In the first place the alkali in the stucco tends to saponify any oils used in the vehicles. A tight, non-breathing surface application is apt to blister, and almost any application is apt to be harmed by crystal pressure where soluble salts are present in the wall. If the wall is provided with adequate internal ventilation, more or less satisfactory service can

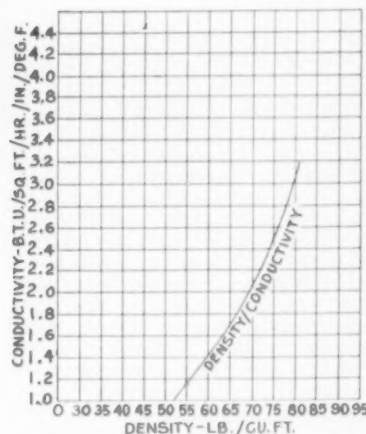


Fig. 2: Thermal conductivity of 3:1 sand-cement cellular concrete mixes at 28 days

be anticipated with a low-breathing surface film, provided adequate flexibility has been incorporated within the film, such as those having a chlorinated rubber base. A number of very excellent results have been obtained in this country and in Europe with plasticized polyvinyl acetate emulsions, which may also be pigmented to give excellent appearance with good service. These films have demonstrated good breathing ability and seem to permit any salts present within the wall to crystallize on the outer surface of the wall. If they crystallize within the pores of the wall, disintegration will result from the pressures developed. In addition, cement-type coatings have given excellent service.

## Cement

# European Cement Manufacture

**Open-circuit ground cement preferred. Slag cements and "expandable" cements among new products**

**T**HE GREATEST WORRY among cement manufacturers in central Europe is to get enough coal. Some of them are even using American coal. The British and French are taking such a large proportion of Ruhr coal that hardly enough remains for any others. What coal the manufacturers do get is apt to be high in ash, resulting in worries for the chemists in controlling compositions. Sometimes ring formation also gives trouble. Because of this coal situation a considerable number of shaft kilns are in use. The sintering method of burning cement

is also used alone and in combination with a rotary kiln. Sintering seems to effect some economies in coal requirements, but shaft kilns cost less to install.

Where a dry feed is used, increasing attention is being given to more effective dust removal. The German people in the neighborhood of cement plants are becoming increasingly critical, and this problem is receiving much study.

Grinding of the clinker is almost wholly in open-circuit compartment mills, and the results obtained seem

to give a generally better all-around cement than where air separators are used. This distinction is receiving quite a bit of study by Dr. Wilhelm Anselm of Heidelberg. Preliminary results obtained seem to favor the compartment mill product. In order to run down differences between the two types of cement, accurate measurements of size distribution are needed. Dr. Anselm is experimenting with an elutriation apparatus, in which the cement is suspended in absolute alcohol. The suspension contained in a cylinder is given a very slight agita-



## EUROPEAN DEVELOPMENTS

tion by means of a glass cylinder, which is raised and lowered very gently. He feels that he is able to measure the grains having diameters below five microns in this way.

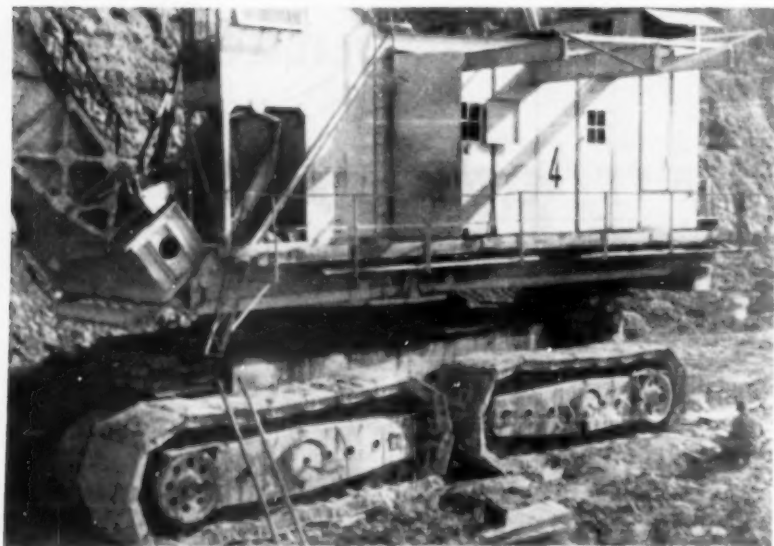
The question of fine grinding of the cement and development of cracks in highway construction has received considerable attention both in Germany and in the United States. A series of test stretches was included in the Autobahnen in both northern and southern Germany. These have recently been studied carefully by German engineers and the conclusion has been reached that the fineness of the cement, at least as measured by the residue on a 176-mesh sieve, does not seem to be a factor in pavement cracking. So long as a concrete reaches a minimum strength, the number of cracks counted in the experimental stretches per given length (usually about one crack per 100 meters) does not vary appreciably. When all is said and done, however, it must be remembered that the Continental system of making a dry mix and then thoroughly consolidating tends greatly to re-



Above: Elutriation apparatus for separation of cement in the fine micron sizes



Left: Headquarters of the Austrian Portland Cement Association located in Vienna



Shovel in the Dyckerhoff quarry in Germany

duce shrinkage and increase strength, so that the amount of cracking should be greatly reduced as compared with wetter mixes. For this reason, secondary effects, such as finer grinding or poor size distribution of the cement, may be obscured.

Two interesting new types of cement were encountered. Henry Losier of Paris has taken advantage of the expanding reaction between sulfates and calcium aluminate to propose a "Ciment Expansive" which on wet curing for about two weeks actually expands. Later as it dries out it may never return to the original cast volume, or may just reach it, depending upon the amount of expanding agent added. This agent is a fused aluminum sulfate, which must be carefully ground and mixed with portland cement. Losier has been able to demonstrate concrete prestressing in this way and has also been able to produce some valuable service in repairing broken arches. This cement is manufactured by Poilet and Chausson of Paris. For the expanding action to take place, a period of initial wet storage is required.

If a suitable blast furnace slag is ground extremely fine and mixed with portland cement and the concrete made therefrom is gauged with saturated sodium chloride solution under proper temperature conditions, extremely high strengths can be obtained. Difficulties have, however, been encountered when the temperature drops too low. This has been called "Ciment Trief."

During the past 15 or 20 years items have appeared in the literature of a "Surciment," made from blast furnace slag, cement and gypsum. This has been produced intermittently in Belgium and France and seems to develop excellent resistance to sulfate-bearing waters. It is now being manufactured on a limited scale in the German Ruhr by G. Musgnung to see what can be accomplished with it.

In most of the cement plants visited, it was interesting to find that Rock Products was being regularly received and read by the cement chemists. They find "Rocky's Notes" interesting and suggestive. They are quick to seize on such developments as the photometric analysis of the alkalis in portland cement and air permeability method of specific surface measurement.

The general attitude toward air entrainment is: "You Americans, with your sloppy concretes, certainly can use air entrainment to advantage, whereas we with our drier mixes have much less need of this development, and besides it is rather difficult to entrain much air in the dry mixes we use." However, they are slowly coming to appreciate where it can be used to advantage, even in Europe.

The German Portland Cement Association is supporting fundamental re-



## EUROPEAN DEVELOPMENTS

search in a newly rebuilt structure in Dusseldorf, under the direction of Dr. Fritz Keil. It is doing some very interesting work on the condition of MgO in the clinker and is obtaining very excellent equipment for a great deal more fundamental work. Similarly, the Austrian association, housed

in a fine new building in Vienna, is making studies under the direction of W. Czernin.

A number of cement companies are introducing well drills for operations requiring blasting. The tendency in the quarries seems to be toward larger and larger power shovels.

## HYDRAULIC LIME MANUFACTURE

**H**YDRAULIC LIME has been manufactured in Europe for more than 2000 years. The Romans apparently used it in some of their concretes. An account of Smeaton's discovery of a hydraulic lime which helped him to build lighthouses is found in most of the histories of portland cement. In many places in Europe, a marl is found which burns to a hydraulic lime. In France a considerable amount of hydraulic lime has been produced through the centuries, but according to information received in Paris at the *Labatoire du Batiment*, the industry has not grown since 1929. The portland cement industry, on the other hand, has been expanding at a reasonable rate, and the conclusions might well be drawn that many people in France are now depending upon admixtures of cement to limes for what strength they want.

In England, through the courtesy

of T. Whittaker of the Building Research Station, a trip was made to a small plant near Cambridge. At that place there is a natural deposit of marl, which was burned in shaft kilns during the 1890's to make portland cement. The stone is soft, so comparatively little work is necessary to break it loose and let it fall into a car. Then it is pulled to the top of the cliff and fed into shaft kilns which have been hollowed out in the cliff. After discharge from the bottom, all by hand rabling, it is pulled up to the crusher house. Here two grades are made, a cheap one simply by crushing rather superficially, while with a little more care and appropriate hydration a lime is produced of excellent workability. This contains a fair amount of core, since such core seems to improve working properties as well as strength. The machinery here mostly dates back 65 years.

In Sweden very little hydraulic lime was encountered, only four brands out of 14 having hydraulic properties. The Swedish seem to like to use a soft-burned high-calcium lime.

The Jura mountain range extends northeastward across Switzerland and into Germany, there forming the famous "*Schwabische Alb*." This is mostly limestone and numerous deposits of marl, which are found in both countries and some of which are used for making portland cement. The operation at Mergelstedt, northeast of Ulm, Germany, seems to be typical. Stone ranging from about  $\frac{1}{2}$  to  $\frac{3}{4}$  in. are picked out in the quarry and form the feed, together with coal, for two shaft lime kilns. The feed and discharge are both automatic. The tendency is to soft-burn the lime so that probably only three-fourths is calcined. After grinding and hydrating, the core is found to be of advantage in improving working and strength properties. This practice might well be adopted in this country. It has been under discussion for several years, but nothing has yet been accomplished.

Hydration may be carried out in an apparatus like the Clyde hydrator. Some, however, simply add some water to the small ball mill and effect a hydration while grinding.

Hydraulic lime is preferred by many for stucco or masonry mortars, but must compete with a portland cement admixture to high calcium lime mortars.

## Mortar

# Activated Lime Mortar for Stucco

Need for improved adhesion in stuccoing cellular concrete surfaces prompted development of "machine whipped" mortar

By OLE GLARBO\*

**T**HE USE of activated mortar was introduced in Denmark only recently, but whenever it has been used the results have always been excellent, and it is especially noteworthy that masons are only too happy to work with this material. It has happened that a team of masons who for a long time had used activated mortar for plastering asked, when the work was finished, to be moved with the activator to a site where it was going to be used again.

The introduction of activated mortar was prompted by the difficulty encountered when stuccoing outer surfaces of gas and other lightweight concretes. The adhesive properties of the ordinary plaster or brickwork

were quite good, but it soon became apparent that it was more difficult to get adhesion to cellular concrete unit construction. In the old days the plaster was often failed to improve the quality, and it is this principle that has been carried further in the activator.

Activated mortar means, generally speaking, that the mortar has been machine whipped. In order to obtain a satisfactory result it is essential to have specially-constructed mixers, and it is such fast-running mixers which are now available in Scandinavia under the name of activators.† They are equipped with paddles, or "beat-

ers," whose peripheral speed is 6-8 ft. per sec.

In central mixing plants, it is practical first to mix the mortar in a screw conveyor and after that let the mixture go through the activator. On the building site the activator can be used for mixing as well as activating. The following points are essential in order to obtain satisfactory results:

1. After the activating process the mortar will be ready for use and no more water should be added later. This is a fundamental rule.

2. The amount of cementitious material shall be reduced about 20 percent over ordinary stucco mortar.

†This machine was developed in Sweden, and an account of the results obtained in that country with 1:2:15 stucco mortars will be found in this issue on page 73.

\*Laboratory of Building Technique, Technical University of Denmark, Copenhagen.



Fig. 1: Specially-constructed mixer used in Sweden for making activated mortar

3. The grading of the aggregate or the sand used must be the finest possible; it is especially important that the amount of fine sand be correct.

4. The time of activation must be 3-5 min. Longer or shorter times would reduce the quality.

As a specific example of the fine quality of activated mortar can be mentioned some results of experiments, which took place during the erection of a test house. As the experiments were partly made in the field without assistance of a skilled laboratory staff, the strength test results varied rather widely. The masons' comments were obtained and proved of great importance.

Five different mortars were used:

1. Ordinary machine-mixed mortar of slaked lime and rounded aggregate, stirred by hand at the site.

2. Same as 1, but activated at the site.

3. Ordinary machine-mixed mortar of slaked lime and irregular gravel aggregate, remixed by hand at the site.

4. Same as 3, but activated at the site.

5. Mortar made from hydrated lime and irregular gravel aggregate, using a blend of two sands, in their natural state, in order to obtain a reasonably good grading of the aggregate; mixed in the activator at the site.

All mortars were prepared on the site under the supervision of the mason, and he decided the amount of water to be used to make the mortar a normally good working consistency.

The five kinds of mortar were used for the experiments, partly practical tests covering the technical qualities from a mason's point of view and partly laboratory tests. To the mason, the mortar properties of interest included (a) settling of the mortar in the tub, or bleeding, and (b) working time of the mortar.

Test (a) was made by taking each kind of mortar separately and filling six cans (10.8 cm. dia. x 15 cm. high) to level measure. After  $\frac{1}{2}$ , 1, 2, 4, 8

and 16 hr., the settling was determined by weighing the water accumulated on top of the mortar. This was calculated as mm. settling per 15-cm. mortar height; results are given in Fig. 2.

Test (b) was based on the opinions of the various mortars by the masons.

The laboratory tests included (c) flexural strength on fifteen 2- x 2- x 12-cm. prisms (with each mortar); the compressive strengths on 2-cm. cubes, 30 on each mortar, age 28 days; air storage molding was done with the mold resting on three layers of blotting paper, and another three layers were placed on top to simulate the suction of the wall; storage was in the laboratory air but all specimens were immersed twice a week for 5 min.; (d) analysis of calcium hydrate and water, and (e) determination of the grading of the sand (Fig. 3).

If the mortars are graded on the basis of the masons' comments from best to poorest, we have No. 5; No. 4; No. 2; No. 3; and No. 1. These opinions correlate with the bleeding results in Fig. 2. Bleeding is suggested as a measure of workability of mortars.

NO	DESCRIPTION	MASON'S COMMENTS	CONTENTS OF MORTARS		BENDING TENSILE STRENGTH		COMPRESSIVE STRENGTH	
			Ca(OH) <sub>2</sub> %	WATER %	AVE. P.S.I.	AVE. DEVIATION %	AVE. P.S.I.	AVE. DEVIATION %
1	ORDINARY MACHINE MIXED MORTAR, STIRRED BY HAND, ROUNDED AGGREGATE	SATISFACTORY TO WORK BUT DOES NOT KEEP WELL IN TUBS	8.25	19.2	210	15	393	11
2	ORDINARY MACHINE MIXED MORTAR, ACTIVATED ON THE SITE, ROUNDED AGGREGATE	SATISFACTORY TO WORK — KEEPS BETTER THAN NO. 1 BUT NOT SO WELL AS NO. 4	8.05	19.0	165	21	370	12
3	ORDINARY MACHINE MIXED MORTAR, STIRRED BY HAND, IRREGULAR GRAVEL AGGREGATE	SATISFACTORY TO WORK — KEEPS BETTER THAN NO. 1 BUT NOT SO WELL AS NO. 2	8.55	16.6	208	9	522	13
4	ORDINARY MACHINE MIXED MORTAR, ACTIVATED ON THE SITE, IRREGULAR GRAVEL AGGREGATE	EXCELLENT TO WORK AND KEEPS WELL IN TUBS. HARDLY ANY STIRRING NECESSARY	8.91	18.0	130	14	305	17
5	MORTAR MADE IN ACTIVATOR ON THE SITE FROM HYDRATED LIME AND COMPOUND SAND, IRREGULAR GRAVEL AGGREGATE	EXCELLENT TO WORK — BY FAR THE BEST. NO STIRRING	8.36	13.8	290	4	660	7

Table 1. Mortar test results

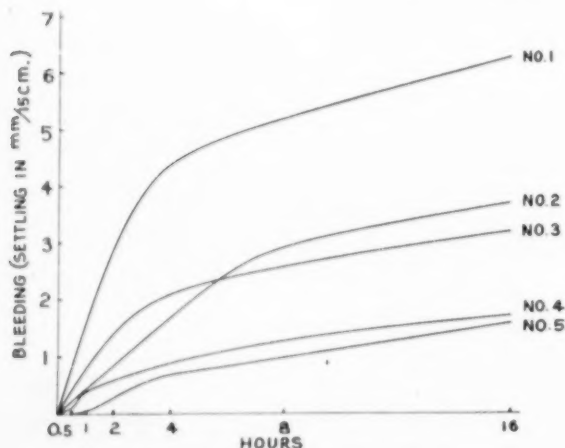


Fig. 2: Bleeding data for different mortars

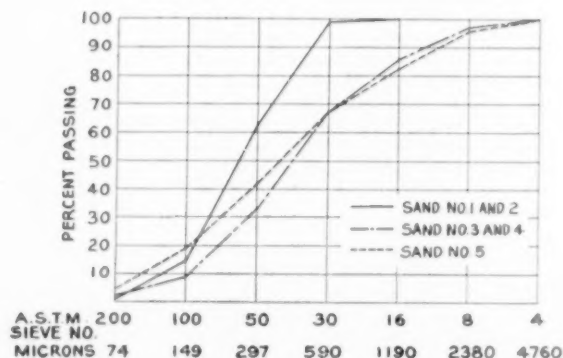


Fig. 3: Gradation of sand used in test mortars

The correlation between the amount of bleeding and the opinion of the masons was excellent, leading to the suggestion that bleeding is closely related with workability.

The best strength results were obtained with mortar No. 5, where an excellent aggregate grading had been obtained (Table I). However, on comparing the strengths of mortars receiving their final mixing by hand or by activator, it will be seen that the former gave a higher value at 28 days. Part of this can be ascribed to the greater amount of water retained by the latter, and partly to the reduced rate of drying and presumably of carbonation after activating. Strength results also should have been taken after longer periods of storage to determine this point. It is suggested that the improvement in workability obtained by activating will result in lower stucco costs.

### Rubber For Road-Building

THE GOODYEAR TIRE & RUBBER Co. has announced the development of a new synthetic rubber powder for use in highway construction. The new material, which was developed in cooperation with Berry Asphalt Co., Magnolia, Ark., was defined as a finely-divided, free-flowing powder, made by co-precipitation of a butadiene-styrene latex and a mineral filler.

The new rubber is said to have many advantages over natural, reclaimed or other synthetic rubbers. As a free-flowing powder, it is easy to handle and mixes freely with the asphalt, whereas other types of rubber show a certain resistance to rapid dispersion.

Several tons of the material have already been produced at Goodyear's pilot plant at Akron, Ohio, and a number of test installations placed in the Middlewest are being studied by research experts.

The rubber can be made available in two forms: as a co-precipitate with some of the fine mineral aggregate normally used in bituminous concrete, or as a premix with powdered asphalt. In either state, the rubber is said to be equally effective.

Tests by an independent testing laboratory showed that from 1.5 to 2 percent of this rubber added to the weight of the asphalt was equally effective as a 5 percent conventional rubber-asphalt mixture in resisting the stripping action of water and frost. The new rubber was also said to show promise as a filler in composition siding, shingles, etc.

### Sand and Gravel Expansion

YAZOO GRAVEL Co., Tuscaloosa, Ala., has expanded its sand and gravel business with the establishment of a new plant just east of the Tuscaloosa airport. The new plant has a capacity of 1000 t.p.d. of sand and gravel. The company is headed by J. H. Wigham, president, and S. E. Hussey, superintendent.



General view of operation in which portable equipment and surge bin are used advantageously

## PORTABLE PLANT USES SURGE BIN

**A**RKHOLA SAND AND GRAVEL Co., Ft. Smith, Ark., recently placed in operation a new Cedarapids portable plant that features the use of a surge bin between the primary crusher and screening plant. The use of a surge bin in a portable plant is in itself quite unique and practical. The surge bin is a steel cylinder holding about 60 tons of crushed stone. It feeds a belt conveyor serving the screening plant that is mounted over steel trucking bins. A 1040 Good Roads crusher is the secondary unit and at the time of inspection a Stedman pulverizer was being installed for final crushing. The primary crusher is a 25- x 40-in. Cedarapids unit.

The rock handled is a hard sandstone that is being taken from a newly opened quarry about 18 miles south of Ft. Smith. A 1-cu. yd. Lorain does the primary loading. A Worthington and a Sullivan wagon drill do the primary drilling. The primary crushing section is driven by a D 17000 Caterpillar diesel. Shipments are made by truck or rail as the plant is adjacent to the Missouri Pacific railroad.

The offices of Arkhola Sand and Gravel Co. are in Ft. Smith, where the company has a ready-mixed concrete plant and a modern high pres-

sure steam curing concrete block plant. In addition to a "black-top" plant at Ft. Smith, the company has a second ready-mixed concrete plant with a sand and gravel operation near Van Buren, Ark.

R. N. Dills is president of the company, P. M. Shaver is general superintendent and H. S. Jackson is engineer. W. B. Holland is superintendent of the new portable installation.

### Aluminum Phosphate

THE GEOLOGICAL SURVEY recently announced the discovery of large deposits of aluminum phosphate in the Florida land-pebble phosphate field, which offers a possible new source of aluminum. The deposits occur in the Bone Valley formation of Miocene age, in a widespread zone immediately above the commercial calcium phosphate deposits, from which they were derived by processes of leaching and alteration. Formerly, the aluminum phosphate had been discarded with the overburden in the mining process. The importance of the deposits will not be known until metallurgical techniques for separating and recovering the alumina and the phosphate are fully developed and tested.



Plant of Arkhola Sand and Gravel Co., Ft. Smith, Ark., features the use of a surge bin between the portable primary crusher and the screening plant



General view of the washer at Virginia-Carolina Chemical Corp.'s Clear Springs, Fla., operation

**Virginia-Carolina Chemical Corp.'s Florida operation pumps phosphate sands 5 miles to flotation plant. Elevators eliminated in phosphate washer and new control unit simplifies centrifugal separation in recovery of fines**

By WALTER B. LENHART

## DEVELOPMENTS IN PRODUCING PHOSPHATE

**T**HE PHOSPHATE FIELDS of the United States are one of its greatest assets. The individual operations making up this giant industry are among the largest material handling operations in the world. Draglines from 5- to 21-cu. yd. capacity are quite common and the individual processing plant investments run into millions of dollars.

The three main phosphate producing areas in the United States are Florida, Tennessee, and the Idaho-Wyoming-Montana section of the Rocky Mountains; Florida is by far the most important producing state.

The phosphate mining and processing operations in Florida include methods that are of interest and use to sand and gravel operators and crushed stone producers; pumping of sand-slime-rock mixtures is a case in point. One of the later developments to be described here is the result of 1½-years' experience by Virginia-Carolina Chemical Corp., Phosphate Mining Division, in pumping minus 14-mesh phosphate sands through a single 14-in. steel pipeline a total distance of 5 miles. This is the longest pumping job of this nature in the world. Another feature to be described is the use of Dorr-Clones for separating the fine sands from the pulp.

Virginia-Carolina Chemical Corp., Phosphate Mining Division (Florida department), is said to have one of the most efficient operations in the Florida phosphate fields. Large tonnages are handled and involved metallurgical processes are required to recover the phosphate values, so this is no small tribute to the able management afforded the company by its operating vice-president, C. E. Heinrichs; Hubert L. Pascoe, manager of the Florida department, and their effi-

cient staff. Mr. Heinrichs' office is in the company's new building in Richmond, Va., and the Florida office is at Nichols. Mr. Heinrichs was one of the pioneer metallurgists in the development and application of froth flotation to phosphate recovery.

### Excavation

In the phosphate fields the ore or matrix is overlaid with variable amounts of overburden that ranges in depth from a few feet up to 30 or even 60 ft. Under this overburden is the almost horizontal bed of matrix. It too is earth-like in general appearance and contains variable amounts of clay, phosphate sands from slimes to 14 mesh, fine phosphate pebbles in the plus 14-mesh minus ¼-in. range, and phosphate rock or larger pebbles between ½ in. to ¾ in. There are few large-sized rock such as 3 or 4 in., but occasionally fossils of larger sizes are found.



A 17-cu. yd. walking Monighan dragline is used to excavate the phosphate matrix

Draglines with booms up to 215 ft. long strip off an area and, after stripping and casting the debris into worked out portions of the pit, excavate the matrix and dump it to a sump alongside. Here one or two men, each handling a hydraulic monitor or "gun," sluice the matrix toward the suction of a 12- to 14-in. centrifugal field or pit pump. This pump may deliver to another pump 1000 or more feet away. Eventually the matrix is pumped into the washer. Steel pipe with flanged ends is favored, although one company in the area is experimenting with Transite pipe. It was said that steel pipe was not giving the performance (life expectancy) that it did a few years ago.

The phosphate mining division of Virginia-Carolina Chemical Corp. follows general practice in mining the phosphate matrix, stripping with large capacity draglines and dumping the matrix near the suction of a field pump. Hydraulic monitors then sluice the matrix to the pump, which delivers it to one or more relay pumps—depending on the distance to the washer. The company has a new 17-cu. yd. Bucyrus-Erie walking Monighan dragline that went into service early this year. In addition to this unit the company operates another 17-cu. yd. 650-B, an 8-cu. yd. 6-W, and an 8-cu. yd. 225-B machine. All are electrically powered.

Virginia-Carolina Chemical Corp. has a washer and flotation plant at Homeland. This was described in detail in the April, 1948, issue of *Rock Products*, page 104.

### Pumping Feed Material

In 1945, when the company took over Phosphate Mining Co., it acquired the Phosmico flotation plant



that had been built to re-treat by froth flotation older accumulations of rejects from still older operations. When these accumulations had been reworked and exhausted the company built a washer at Clear Springs, about 5 miles from the flotation plant. The question arose whether to build a new flotation plant at Clear Springs, or transport the flotation feed material (all minus 14 mesh) by some method to the older Phosmico plant. If rail transportation had been decided on, the fines would have had to be dewatered, but with some of the material in the 200-mesh range, this posed too great a problem. The final decision was to pump the material the 5 miles.

One main factor in the final choice of a system of transportation by pumping was the development by Pettibone Mulliken Corp., Diamond Alloy Division, of a slurry pump of such efficiency that only 900 hp. is required to pump the 5 miles. The pipeline was designed to handle 4580 g.p.m. at 13 percent solids, although in actual practice it has done considerably better than that. The top size is 14 mesh and about 70 percent of the material will be plus 200 mesh. The 14-in. line is handling 150 long dry tons per hour at a velocity of 9.6 f.p.s.

Any one pump in the line (there are a total of six pumps in relays) can be shut down, the pulp then flowing at reduced velocity. The pipeline can be shut down fully loaded and operations resumed by starting No. 1 pump. The other pumps then automatically cut into service in proper sequence.

Each of the 12-in. Pettibone Mulliken pumps is powered by a 150-hp. wound-rotor motor that operates at 1200 r.p.m. and is V-belted to its pump to give a speed of approximately 600 r.p.m. V-belt coupling is deemed better than a direct-connected motor because of higher costs of slow speed motors, and it is easier to maintain optimum clearance between the pump rotors and the shell liners with a V-belt drive.

On the suction side of each pump is a rubber sleeve that acts as a



Homeland, Fla., plant of Virginia-Carolina Chemical Corp. The flotation plant is in the foreground, washer in the background

flexible coupling. On the discharge side of each of the 12-in. pumps, but in the 14-in. line, is a slip-joint. These take care of any expansion or contraction in the line. Near the discharge of each pump is a 14-in. dia. vertical standpipe that tends to cushion air locks in the line. This pipe is capped and acts as an air trap.

The Clear Springs washer, as will be seen in the accompanying flow diagram, is laid out so the minus 14-mesh material can be pumped either to a surge pile or pond, or sent to the 5-mile pipeline, or both. In either event two debris tanks at the head of the line play an important part in this transportation system. Minus 14-mesh material from the washer can go to the long pipeline, or can be pumped to the surge pile area. When the washer is not operating, the material in the surge pile area is sluiced by hydraulic monitors (as shown in the illustration) to a field pump and the material delivered back to one of these tanks where the first 12-in. pump picks it up and builds the pressure to 45-50 p.s.i. and sends it into the 14-in. line.

The total distance pumped is 25,710 ft. The second pump is 5575 ft. from the first pump. The next spacings are 4216, 4459, 3774 and 4976 ft., respec-

tively. The final pump is 2710 ft. from the flotation plant where the slurry is elevated 45 ft. into the receiving bins. The variations in pump spacings are due mostly to differences in elevation.

The two surge tanks referred to have an automatic floatless liquid level indicator. B&W floatless liquid level control relays are used. This type was selected because of the solids present and because of turbulence in the tank. Ten electrode holders are mounted vertically in the side of the tank. Each electrode is protected by a piece of angle-iron that slopes downward at a steep angle. These shelves of angle-iron protect the electrodes from downward shifts of high solids in the pulp. By the use of an electrical circuit, in which a Minneapolis-Honeywell Modutrol plays an important part, the primary contact for the motor is not made until the liquid level in the tank is near the top, after which another contact closes and brings the motor up to full speed. As the liquid level in the tank falls, the pump automatically reduces its speed until input to the tank balances output. Provisions are also available for manually controlling the operations should any defect develop in the floatless level control system.



Left: Minus 14-mesh washer debris is reclaimed by hydraulically sluicing material to suction of pump located on rim of pit and is pumped 5 miles to the flotation plant. Right: Sluicing material to suction of pump at pit



## PHOSPHATE



Left: A 16-in. field pump designed to handle pit-run feed is mounted on a steel sled for portability. Right: Relay station in the 5 mile long pipeline used for transporting flotation feed material. A multi-stage deep well turbine pump (foreground) supplies clear water for the glands of the 12-in. pump in the background

Each pump in the 5 mile long assembly requires about 50 g.p.m. of fresh sealing water. The two pumps near the plant get water from a large deep well turbine pump that serves the washer. It delivers water at 60 p.s.i. to a small Gardner-Denver booster pump that raises the pressure up to 110 p.s.i. The booster pump operates at 3600 r.p.m. Fresh water had to be provided at each of the other pumps, so 4-in. dia. wells were put down from 100 to 400 ft. at each site. A 12- to 16-stage Peerless deep well turbine pump, powered by a 7.5-hp. U.S. Electrical motor, is at each site. These pumps operate at 3450 r.p.m. and deliver sealing water at 110 p.s.i., and at the rate of 30 g.p.m.

The pipeline has been in service 1½ years. Up to the time of inspection about 2 miles of the pipe had been replaced. Operating costs have been well within the cost estimates and the operators feel that it is a highly successful installation. The pipe is special-analysis spiral ¼-in. steel pipe

with flanged ends, made by Armco.

The electric control on the 5-mile pipeline is a remote control system by which all pumps in the line can be started, speeded up, slowed down, or stopped all from one station. The pumps are inspected once per shift by a maintenance man; otherwise only one man is required to operate the system.

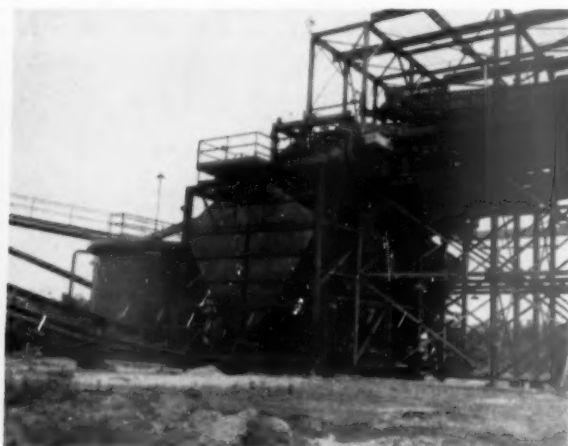
Remote control is accomplished by use of the Minneapolis-Honeywell Modutrol. The ground is used as the return conductor. A current transmitter at each pump station keeps the operator informed of pump operation. The system is interlocked and time-delayed so if a power failure occurs that is of short duration, all units resume operation in their proper sequence without attention. The sealing water pump is the first to start automatically in the sequence. Should the rate of delivery to the gland at 110 p.s.i. fall below requirements, the slurry pump automatically stops and the current transmitter is actuated,

notifying the operator of the pump's condition. The heart of this control system is the Magnetrol flow alarm set at 30 g.p.m.

Several of the Pettibone-Mulliken Diamond Alloy pumps have been in service at the Homeland plant of Virginia-Carolina Chemical Corp. They have given excellent performance records with respect to abrasive resistance and pumping efficiency. It was said that maintenance on the newer type of pump was about half that of the older types. At the time of inspection of the Clear Springs operation, a large diameter field pump was being placed in service. This is a 16-in. unit designed to handle a pit-run feed which includes the coarser sizes. The unit being installed was mounted on a steel sled for portability and was directly connected to a 500-hp. motor.

### Washing Phosphate

The Clear Springs washer was designed in the Florida engineering department under the direction of K. C.



Left: The 36-in. x 30-ft. double log washer is mounted on screw jacks so that the slope of the bottom can be adjusted. Right: Loading bins (center) at the washer for fine phosphate rock. The circular tanks at left are ahead of the pumps that deliver the minus 14-mesh material through the 5-mile pipeline

## PHOSPHATE

Browne, department engineer, and differs somewhat from conventional phosphate washing practice in that all elevators are eliminated. Also, the mud-hogs or disintegrators used are company designed and reduce everything to minus  $\frac{3}{4}$  in. with minimum production of fines. The storage bins, instead of being alongside or over the railroad tracks, are set back a considerable distance from the car loading point and a 36-in. belt conveyor passes under the 400-ton capacity parabolic bins. The plant is of steel construction throughout.

By referring to the flow diagram the essentials of the washer can be observed. The main items in the plant are: (1) stationary slotted steel plate scalper to remove some of the 14-mesh material and slimes; (2) double-deck 6- x 12-ft. Allis-Chalmers low-head wet screens with  $\frac{3}{8}$ -in. top deck, oversize going to the disintegrators; (3) log washers; (4) single-deck 6- x 12-ft. Allis-Chalmers low-head wet screens, two of 5-mesh deck; (5) four 6- x 12-ft. Allis-Chalmers low-head screens with wire to suit requirements; and (6) 36-in. loading belt, powered by a 25-hp. gearmotor.

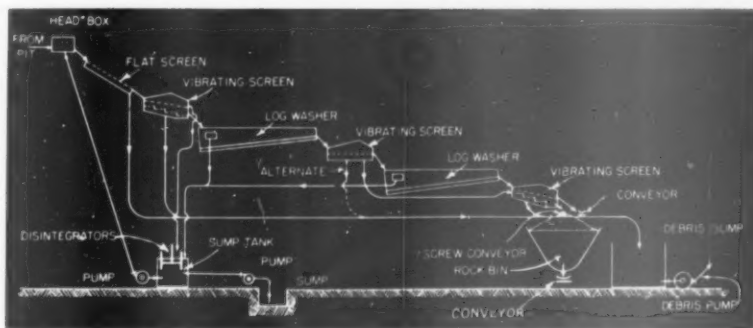
The plus 14-mesh minus  $\frac{3}{8}$ -in. material goes to the first set of log washers. The log washers discharge to the second set of screens which removes the plus 5-mesh material for scrubbing in the second set of log washers. The minus 5-mesh material goes to the lower screens for final screening and dewatering.

The plus 5-mesh material from the second Lo-Head screens (after log washing) goes to the third set of vibrating screens for coarse rock preparation. The lower decks of these screens use 14-mesh stainless steel Ty-Rod (No. 9707) for final screening.

The log washers are a new design manufactured by Georgia Iron Works (G.I.W.) and are 36-in. x 30-ft. double log washers, mounted on screw-type jacks so that the bottom slope can be varied from 1 to  $2\frac{1}{2}$  in. per foot. Each unit is driven through a V-belt drive by a 75-hp. motor.

Log washers in the phosphate fields have become more or less standard practice. Their success there is attributed to the fact that minus  $\frac{3}{8}$ -in. material is sent to the washers. Anything coarser than this size is usually first screened out and then disintegrated in a hammer-type mill, or so-called "mud-hogs," and the throughs sent back to the screen ahead of the log washers. In this manner no pieces of clay larger than  $\frac{3}{8}$  in. ordinarily get into the washers and very likely most of these fragments are broken down further still than would be indicated by a single-screen screen analysis.

Secondly, in the phosphate fields it is not desirable to do any more grinding in the scrubbing system than is necessary, the desired goal being to clean off the surface of the particles and not to fragmentize them.



Flowsheet of Clear Springs washer. The operation is featured by the absence of elevators, use of disintegrators to reduce oversize to minus  $\frac{3}{4}$  in. without excessive sliming, and car loading with a conveyor belt.

Thirdly, it must be recalled that pit-run material is sluiced to the suction of a field pump and these hydraulic guns are quite effective in breaking up masses of clay. After being picked up by a field pump the pulp is pumped through long lengths of steel pipe to the suction of a second (or even a third, if necessary) field pump and the pulp then delivered to the primary screen in the washer. The violent treatment in the pump and in the pipelines is a decided factor in the ultimate washability of the clay in the phosphate matrix.

At the Clear Springs washer the plus  $\frac{3}{8}$ -in. material goes to two V-C disintegrators, the feed being split between the two machines. The disintegrator is a patented development of the company. It operates at 190 r.p.m. Each unit requires a 125-hp. vertical-type motor. The disintegrator reduces the material to minus  $\frac{3}{4}$  in., which is pumped back to the head of the first screen in the washer.

### Centrifugal Separation of Fines

The DorrClone, as used at Homeland, is finding wide acceptance in the phosphate fields for separating finer sizes of sand from thin pulps, sands between 200 to 325 mesh. In the March, 1951, issue of *Rock Products*, page 74, the use of this equipment at a large phosphate treating plant in the Florida fields was described. However, since that article

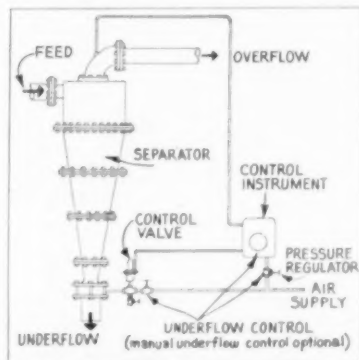
was published, a new type of control unit has been developed that deserves further comment.

The DorrClone is a compact classification unit using centrifugal force instead of gravity to make a separation. It was first used in the Dutch State Mines to remove minus 50-micron sand from coal. The Dorr Co. was the first in the field to develop and exploit this type of separatory unit.

The unit looks like a small, conventional dust collector. Pulp is pumped in at a pressure of about 14 p.s.i. This inlet pressure governs somewhat the operation of the cone, for the greater the pressure, the greater the centrifugal force within the cone. The coarser and heavier fractions discharge at the lower apex of the cone through an automatically controlled tire-type outlet valve. This valve is important, for with a hand-operated control, pressure within the cone cannot be controlled continuously and accurately. The DorrClone is of heavy cast construction with flanged sections, so if any part needs replacing or inspection it can be done with relative ease. The point of greatest wear is said to be in the lower cone because in that section there is a greater concentration of the heavier and more abrasive material moving over a relatively small circle. Rubber lining is used where materials are unduly abrasive.

The main new feature of DorrClone operation is the automatic underflow control device called the Vaectrol. It was found through experiments that physical adjustments had to be made to the cyclone when there is a considerable change in feed solids. For the cyclone to produce a consistently thick underflow these adjustments should be instantaneous in response to feed changes and, consequently, should be fully automatic.

It was discovered experimentally that a vacuum existed in the core of an operating cyclone. The magnitude of this vacuum can be directly correlated with the consistency of the cyclone underflow. The control device or Vaectrol utilizes this vacuum as the signal with which to maintain substantially constant underflow conditions.



General arrangement of cyclone separator equipped with automatic underflow control



## PHOSPHATE

The basic design of the control unit is shown in the line drawing. The control instrument is of the sensitive non-hunting type capable of operating in response to a 0-10 or 0-20 in. of water control range. Changes in vacuum are relayed to this instrument, which in turn operates a pressure booster. An air compressor developing 100 p.s.i. is connected through this booster to the rubber apex valve so that pressure in the valve can be varied between zero and 90 p.s.i. in response to changes in the output of the control instrument. The vacuum, therefore, controls the apex valve pressure which determines the size of the apex orifice and consequently the consistency of the underflow.

The consistency of the underflow is set by adjusting the control point of the instrument to the corresponding vacuum in the cyclone. As an example of how the Vactrol control operates, the control is set for 6 in. of water vacuum corresponding to an underflow density of 72 percent solids and an apex valve pressure of 75 p.s.i. If the feed pulp becomes heavily loaded with coarse material, the underflow volume (and density) will increase and consequently the vacuum will increase to perhaps 10 in. The control instrument receives this signal and decreases apex valve pressure which in turn opens the orifice. This lowers the vacuum to the point where equilibrium is re-established at 6-in. vacuum but at an apex pressure somewhat lower than the original. The density of the underflow will again be about 72 percent solids. The automatic control feature of the DorrClone was developed cooperatively by Dorr Co. and The Foxboro Co.

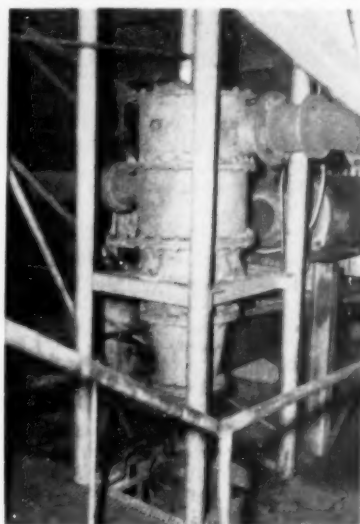
As an example of DorrClone production, cumulative samples of feed, overflow and underflow taken half-hourly over a five-day period are summarized in Table I. The unit was desliming minus 14-mesh washer debris for recovery of plus 200-mesh material. Feed averaged 750-800 g.p.m. and pressure was 14-15 p.s.i.

At the Homeland flotation plant of Virginia-Carolina Chemical Corp., a 24-in. DorrClone was installed as a thickener ahead of the conditioners so that extra feed could be conditioned ahead of the Denver Sub-A float cells. By its use 150 t.p.h. of extra feed was possible. The feed to the cone was 15 to 35 percent solids with pressure maintained at 14 p.s.i. The material was plus 150 mesh and the overflow went to a thickener. This tonnage was achieved with a 4-in. rubber apex valve but could be doubled with a 6-in. valve. The rate of delivery was 1200 g.p.m.

At the same operation of this company, a 24-in. DorrClone made a 98.99 percent recovery of plus 150-mesh material with an underflow density of 71.3 percent. The input was 768 g.p.m.; 89 to 91 percent of the minus 200, and 92.9 percent of the minus

Table I. Production data of cyclone-type separator

Feed, percent solids	Underflow, percent solids	Overflow, percent solids	Underflow, plus 200 rec.	Overflow, minus 200 elim.	Feed, t.p.h.
14.1	70.2	6.5	97.14	89.27	32.8
22.1	69.8	5.8	93.88	97.07	36.9
13.5	67.2	4.4	97.23	88.07	25.5
28.7	76.6	5.1	97.55	93.24	41.4
14.2	72.8	5.5	96.83	90.64	33.8



Using centrifugal force to make a separation, this cyclone-type unit separates the finer sands from the pulp. Automatic control aids in producing a consistently thick underflow, even with considerable change in feed solids

325 mesh was rejected. The feed material was similar to that in Table I.

### Personnel

C. E. Heinrichs is vice-president and operating head of the Phosphate Mining Division of Virginia-Carolina Chemical Corp. Hubert L. Pascoe is manager of the Florida department; other Florida personnel include K. C. Browne, department engineer; R. A. Hardy, chief electrician; W. R. Cullop, general superintendent, Clear Springs and Phosmic operations; E. E. Brower, general superintendent, Homeland operation; J. C. Long, flo-

tation superintendent, Homeland operation; John H. Clary, assistant flotation superintendent, Homeland operation; O. Charles Chapman metallurgist, at Nichols; and Earl H. Thompson, general construction superintendent.

### New Forms of Riprap

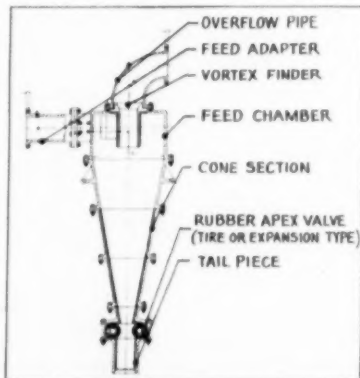
THE BUREAU OF RECLAMATION recently announced that following two years of laboratory experiments, its Branch of Design and Construction in Denver, Colo., is ready for prototype testing of asphaltic concrete and soil cement as slope-protecting materials. A 3 ft. thick soil cement facing on the upstream slope is being placed for 200 ft. on a test structure. On the remaining 200 ft., asphaltic concrete is to be placed in thicknesses varying from 6 to 18 in. Quantities of materials in specifications for the test embankment include about 46,000 cu. yd. of earth fill, 150 tons of asphalt and 1700 bbl. of cement.

Because of economies which may be realized from use of the substitute materials in lieu of riprap hauled from distant sources, the bureau estimates that several million dollars may be saved on future earth dams in the Missouri Basin. On Bonny dam itself, about 500,000 tons of rock and gravel were quarried near Golden, Colo., trucked to Boulder, loaded on railroad cars, shipped to Burlington, Colo., and finally trucked to the dam, at considerable expense. Bonny dam, a new feature of the vast Missouri River Basin project, is on the South Fork of the Republican river about two miles west of Hale, Colo.

For upstream dam faces on the Great Plains, rock for riprap must now be obtained from sources 50 or more miles away. At some potential sites for bureau dams, riprap would have to be hauled by train or truck up to 400 miles, making riprap an expensive part of dam construction. It was stated that more than 40 earth dams are now in the planning stage in just the area of the bureau's Region 7 alone.

### Builds Flood Wall

MISSOURI RIVER SAND & GRAVEL CO., Boonville, Mo., recently completed the construction of a flood wall along the Missouri river bank, to protect stockpiles of sand. New steel barges and diesel equipment, for use on both land and water, are other recent improvements at the plant. In addition to its sand and gravel business, the company also produces concrete block.



Sectional elevation of the standard cyclone. A tire-type valve is shown on the underflow connection



# GRINDING GYPSUM SEPARATE FROM CLINKER

Separate grinding and subsequent blending of gypsum and clinker suggested to minimize false set of cement and for improved control of product and grinding procedure

**T**HE PRESENT UNIVERSAL practice of admixing gypsum in portland cement is to grind the gypsum along with clinker to give the finished product, cement. This procedure not only enables the elimination of a separate installation for grinding gypsum, but also ensures a very intimate blending due to the appreciable time over which the mill charge is subjected to a tumbling action.

If the purpose of a cement grinding unit is considered purely and simply to be the production of a "fine" cement, without much emphasis being placed on factors like size gradation in the finished cement, temperature and humidity conditions in the mill, or very accurate proportioning of admixtures, there is much to be said in favor of the present practice of simultaneous grinding of clinker and gypsum. With the advent of demand for fine cements and the subsequent realization of the important role played by the coarser particles of cement, it is no longer possible to consider the problem of clinker grinding in so simple a light. The purpose of this discussion is to point out the considerable advantages to be gained by grinding the clinker and gypsum separately.

One very important advantage of the above-mentioned procedure—perhaps the most important—will be the virtual elimination of false set in cement. False set or premature stiffening of cement paste is a disturbing feature of modern fine cements, the unpredictable incidence of which has a very detrimental effect on the potential usefulness of a cement. While its mechanism is as yet but imperfectly understood, false set<sup>1</sup> is usually attributed to dehydration of gypsum, and the recommended step for minimizing such dehydration is to keep the mill temperature at a low level. But dehydration of gypsum during grinding cannot be considered a sufficiently complete explanation for the often observed tendency of fine cements to exhibit false set on aeration. Here the more likely factor is the size of gypsum particles in cement. Rather surprisingly, the phenomenon does not seem to have been studied experimentally from this point of view. In a recently published review of references to false set<sup>2</sup> there is

By D. A. WADIA\*

no mention of any studies which attempt to correlate incidence of false set in a cement with the fineness of its gypsum constituent.<sup>†</sup>

It is interesting to note that prior to about 1928 there is practically no mention in the literature about observation of this abnormal set. This may very likely be due to the coarser grinding of earlier cements, which consequently contained larger sized gypsum particles. This latter fact can greatly help in making a cement less susceptible to conditions of hot storage or aeration. Further, coarser grinding of cement involves less time of passage of material through the mill and reduced generation of heat, both of which factors are favorable for minimizing dehydration of gypsum.

## Efficiency of Grinding

In the present system of grinding, because of its relatively soft nature, the gypsum constituent will all be concentrated in the very finest fraction of portland cement. This fact can greatly affect the grinding efficiency of a mill, since it is the fine portion of a cement that unfavorably influences grinding efficiency, due to its tendency to form a coating on the grinding media and mill lining plates.

Objection on this score is particularly true for open circuit grinding. In closed circuit grinding, while the possibility of any considerable over-fine grinding of gypsum is avoided, mention must be made of the tendency for segregation of gypsum and clinker, though after a run of some time equilibrium is reached.

One very important limitation of present-day grinding practice is that, if as a result of technological advances it were possible to specify a particular manner of distribution of particle sizes in cement,<sup>3,4</sup> then the presence of an extraneous material like gypsum (having a different density and grindability) will present

<sup>†</sup>Since the degree of fineness of gypsum seems to be closely linked with the liability of a cement to exhibit false set, it would follow that closed circuit ground cement should be less prone to exhibit false set than if it were ground in open circuit. It must be noted, however, that if the air used for closed circuit grinding is too dry, the conditions of grinding would correspond to a certain extent to aeration of cement.

serious difficulties in the design of air separators.

## Steam Tempering

It has been pointed out that the retardation of set in portland cement is not entirely due to the chemical action of gypsum, but is also brought about by the action of steam given up by gypsum at the elevated temperature of grinding. A cement mill can therefore also be said to serve as a steam temperer, albeit to a very limited and uncertain extent.

If, therefore, clinker and gypsum were to be ground separately, a proper control of set would require either (a) a separate steam temperer for treating the clinker, or (b) addition of larger percentages of gypsum. The former course is decidedly preferable. It has long been known that tempering at elevated temperatures has a markedly beneficial effect on portland cement.<sup>4,5</sup> Among some of the advantages are retardation of set (thus permitting a reduced optimum gypsum content for a cement), lowering of heat of hydration, reduction in water requirements for normal consistency, and slaking out of all free lime. In fact, controlled steam tempering of portland cement is a process of sufficient importance to merit consideration in its own right independent of other factors.<sup>5</sup>

If controlled steam treatment (which for tempering up to the optimum state consists essentially of the activation of  $C_3S$ ) were to be introduced as a regular process, there are several points outstandingly in favor of treatment of ground clinker prior to blending it with gypsum rather than steam treating the finished portland cement. This is because the optimum temperature and pressure conditions required for rapid and efficient tempering of the ground clinker compounds (particularly if the slaking out of uncombined  $MgO$  is the goal) may unfavorably affect the physical state of gypsum.<sup>6</sup> The simplest and easiest way of meeting this difficulty is to grind the gypsum and clinker separately.

## Surface Area of Cements

The specific surface of cement as usually reported is the sum total of the surface areas of its clinker and gypsum constituents. This method of

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reporting surface area values is not desirable, however, and at times can lead to very misleading conclusions. Because specific surface values are generally interpreted as indications of a cement's early strength-developing potential, only the surface area of the clinker constituent can be said to have any significance. The surface area of gypsum, which has the short term role of a setting time retarder, is at best of secondary importance.

Yet, as stated earlier, because of its easy grindability, gypsum will be concentrated in the very finest fraction of a cement, and will therefore contribute to a large proportion of the total surface area of a cement. As a consequence, much of the increased fineness of rapid hardening cements (which usually also require higher gypsum percentages) is due to the extra-fine grinding of the gypsum. In other words, such inflated specific surface values do not provide a true indication of a fine cement's rate of hardening characteristic. Further, in comparing the surface areas of two cements, totally erroneous conclusions of performance will be arrived at in the event of there being any wide difference in their gypsum contents.

If clinker and gypsum were to be ground separately, it would readily be possible to determine the separate specific surfaces of the ground clinker and gypsum. The former value will be of particular significance, and if its determination were to be introduced as a regular feature of plant control, the data thus collected would prove to be of considerable value in arriving at a more rational understanding of a cement's optimum fineness requirements.

### Proportioning

The work of Lerch and others<sup>6,7</sup> has shown that each cement of a given composition and fineness has an optimum gypsum requirement. Addition of this optimum quantity, which in many cases was above the requirements of specifications (the required  $SO_3$  being as much as 3-4 percent), was found to result in improvements like reduced autoclave expansion and increased early tensile and compressive strengths; at the same time the greater gypsum addition brought about an increased tendency for false set. Whittaker and Wessels<sup>8</sup> recommend that to minimize this tendency the mill temperature during grinding should be kept below 80 deg. C.

It follows that if advantage were to be taken of this optimum addition, (a) the cement should be of a high degree of uniformity, which is true for most reputable cements of today, (b) steam tempering should be resorted to for lowering optimum gypsum requirements, and (c) adequate means should be available for accurate proportioning of gypsum. Present methods of gypsum feeding are considerably influenced by size of feed,

incidence of surface moisture, etc., and are at best suitable for keeping the gypsum percentage within fairly broad limits; these methods cannot adequately satisfy the exacting requirements for admixing air-entraining agents, coloring agents, and other additives.

### Optimum Fineness of Gypsum

As would be expected, the degree of fineness of gypsum has a marked influence on its retarding ability. Brans,<sup>9</sup> for instance, found that as the percentage of gypsum was gradually increased, at a certain percentage a pronounced retardation suddenly occurred. The percentage addition at which this accelerated influence occurred was found to be higher according to the coarseness of the gypsum.

With regard to the actual desirable fineness of gypsum, it can be broadly defined as that minimum fineness which will satisfactorily allow the gypsum to perform its function of a retarder. If the gypsum is of a greater fineness than this minimum, the cement may exhibit setting time abnormalities due to its increased susceptibility to storage conditions and other factors. In deciding on this optimum fineness, consideration should also be given to field conditions in which the cement is to be used. Thus, in torrid climates it would be preferable to use gypsum that is ground coarser than normal; if necessary, a somewhat larger percentage of gypsum can be added to compensate for the slower rate at which the gypsum will go into solution.

It would add greatly to the normalcy of behavior of a cement if the gypsum present in it were all a uniform size. Uniform grain size will ensure that the rate of the gypsum going into solution is reasonably constant, thus enabling the cement to have a very constant setting time. Separate grinding of gypsum in closed circuit will readily permit the attainment of this desired uniformity of size.

Controlling at will the size of gypsum particles in cement is impossible at present, since in the simultaneous grinding of gypsum and clinker, preference must invariably be given to meeting the fineness requirement of the clinker constituent, upon which

largely depends the hardening characteristic of cement. The consequent subordination of the optimum fineness requirement of gypsum is responsible for many of the unwanted abnormalities of very fine cements.

### Some Practical Considerations

A flow scheme of a desirable grinding procedure is given below.

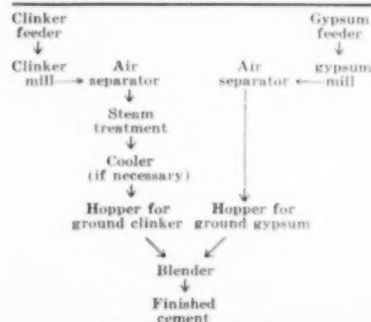
In practice, since the gypsum percentage required for admixture is comparatively small where there are a number of cement mills, there need be but one gypsum mill having a sufficient output for meeting the demands of all the other clinker mills. While the easy grindability of gypsum will ensure a low development of heat due to friction, it would be desirable to install arrangements for cooling the mill shell and, if necessary, have means for humidifying the air carrying the circulating load of gypsum. The chances of any dehydration of gypsum will thus be entirely eliminated.

If the ground clinker is allowed to leave the mill at a much higher temperature than is generally permitted at present, then, in the immediately following tempering process, it could be possible to produce the required quantity of steam by merely bringing the hot ground clinker into contact with an atomized spray of water. Thus, frictional heat, which ordinarily represents a waste of power, can be utilized usefully. If the clinker is ground in closed circuit, some cooling of the ground product will result due to contact with the circulating air. It may therefore be necessary to pipe in or generate a small quantity of steam for raising the temperature of the system to the desired level. Such extra steam will also be required in case higher temperature-pressure tempering conditions are aimed at (as for slaking out uncombined  $MgO$ ).

With regard to the blender for mixing clinker with gypsum and other admixtures, batch blenders would be decidedly preferable for ensuring accurate proportioning and thorough intermixing. This method of blending, however, may not be suitable for rapid handling of the large tonnages involved in cement production. Probably no present type of blender is suitable for clinker-gypsum homogenizing, and a special type will have to be developed.

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# PRODUCING AGSTONE AND CONSTRUCTION MATERIALS

**Melvin Stone Co., Melvin, Ohio, installs new agricultural limestone processing plant. Plant also produces roadstone, aggregates and various sands**

By HUBERT C. PERSONS\*



Agricultural limestone plant of Melvin Stone Co.

**F**ERTILE SOIL TO RAISE abundant crops and good roads on which to transport the crops to market are a matter of pride in southern Ohio. Melvin Stone Co. at Melvin in Clinton county, Ohio, contributes largely to both good crops and good roads. The company's agricultural limestone processing plant, completed in the summer of 1951 at a cost of \$150,000, is said to be one of the largest in the state.

Occupying a 109-acre site which was known as the Custis farm only a few years ago, the main plant of Melvin Stone Co. is now the scene of great activity. This modern plant produces ground agricultural limestone at a rate of more than 40,000 tons a year. General manager J. F. Yarger says he expects to step this up to 100,000 tons a year. This product is marketed under the trade name "Beamstone," C. C. Beam, Inc., having been the original name of the firm.

The plant also produces roadstone and concrete aggregates, fluxstone for grey iron foundries, and concrete, plaster and mason sands. Last year the company sold about 100,000 tons of classified sands in addition to bank run gravel.

The roadstone is shipped from the plant via the B. & O. railroad to the company's retail distribution yards at Blanchester, in the southern part of Clinton county. Here there are four concrete stave silos each holding five carloads. Delivery from the Blanchester yard to job sites is by motor dump trucks. The company also operates a sand and gravel plant at Sligo, 7 miles west of Wilmington, the county seat.

## Power Plant

A power plant which produces about 75 percent of the electric current used in the Melvin operations is one of the major features of this company's set-

up. The power plant equipment includes one 525-hp. direct-connected Fairbanks-Morse marine-type diesel engine; one 200-hp. Fairbanks-Morse Y-type oil engine, and one 100-hp. Fairbanks-Morse Y-type oil engine. The 525- and the 100-hp. engines are connected to a generator supplying 440-v., 60-cycle a-c current. The 200-hp. engine is V-belt-connected to two crushers and also supplies power for a friction hoist which operates quarry dump truck bodies.

Another feature of the plant is a new storage building, 200 ft. long and 40 ft. wide, with a capacity of 8000 tons of agricultural limestone. A 185-ft. screw conveyor designed by J. O. Harris, production manager, is suspended from the Quonset-type roof. This conveyor piles the ground material in a windrow the full length of the building so that it can be picked up easily by a front-end loader. A custom-made loader, designed by Mr. Harris, is now being built.

## Quarry and Crushing Operations

Stripping of the 9- to 10-ft. overburden in the quarry is done with a

$\frac{3}{4}$ -cu. yd. P&H gasoline-powered shovel. Much of the overburden is sold for fill and the remainder is dumped into an old section of the quarry. The present quarry averages 48 ft. in depth.

Blast holes are drilled with a Model 44 Loomis churn drill. Blasting is done with 5-in. tube powder and delayed action caps made by Hercules Powder Co. Stone is shot down about twice a week during the summer.

The Melvin quarry is exceptionally clean. Shots are well controlled so that good breakage is obtained and secondary blasting is rarely required. Stone is loaded on trucks with Easton side-dump bodies which carry 7-ton loads to the primary crusher. Loading is done with a  $2\frac{1}{2}$ -cu. yd. Marion shovel powered with a Caterpillar D17000 engine.

Primary crushing is done with a 30-in. Superior McCully gyratory crusher. A Symons cone crusher is used for intermediate crushing. Secondary crushing is done with two 42-in. Stedman disintegrators, impact-type crushers operating at 900 r.p.m. The cone crusher reduces the stone to about  $2\frac{1}{2}$  in. sizes. The disintegrator reduces it to an average size of 1 in. The plant equipment also includes an Allis-Chalmers roll crusher, installed two years ago to increase the production of manufactured road sand.

The roadstone is passed over four 4- x 8-ft. Allis-Chalmers Ripl-Flo screens. All roadstone goes into bins by sizes. Minus 8-mesh material is conveyed to a drag-type Webster classifier to produce limestone sand.

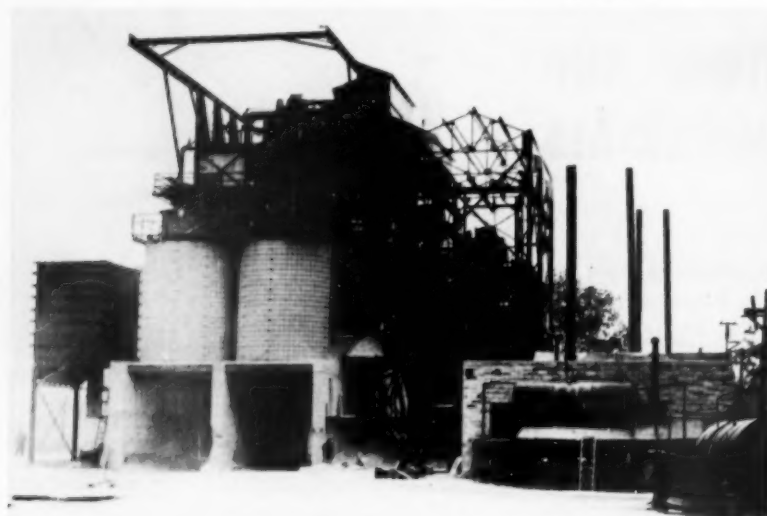
Four continuous bucket elevators mounted on two strands of chain are used. The roadstone is conveyed to temporary trackside storage in self-powered side-dump gas-electric cars. From trackside the material is picked up by a diesel-powered Industrial Brownhoist locomotive crane and



Left to right, C. C. Beam, J. F. Yarger and P. J. Andrew in front of dryer at the agstone plant

\*Industrial public relations consultant, Chicago, Ill., for many years manager, Public Relations Bureau, Portland Cement Association.





General view of crushing plant; engine room is at right, stone bins and loading tunnels at left

placed in storage piles. The same equipment is used to load outgoing railroad cars. Roadstone shipped by truck is handled by two Model 75W Haiss bucket loaders.

### Agstone Plant

The agricultural limestone is ground in two mills—a No. 3 Allis-Chalmers Pulverator and a self-screening Bradley Hercules, Jr., pulverizer. The ground stone is screened over two double-deck 3- x 6-ft. Allis-Chalmers screens. Drying is done in a 60-in. x 24-ft. Hetherington-Berner gas-fired rotary dryer. The plant has a capacity of 600 t.p.d.

From the mills, the material goes to truck loading bins by bucket elevator and screw conveyor. Additional material to be stored is carried by screw conveyor into the large storage building which has been previously described.

Melvin Stone Co. offices occupy an

air-conditioned five-room concrete masonry building. A smaller, three-room concrete masonry building contains a modern laboratory where close check is kept on the physical characteristics of the limestone. Chemical analysis is made periodically by a commercial laboratory.

Physical analysis of the company's agricultural limestone shows:

99.8 percent passing 8-mesh screen  
81.75 percent passing a 20-mesh screen  
56.1 percent passing 60-mesh screen  
46.6 percent passing 100-mesh screen.

Chemical analysis shows 21.08 percent minimum calcium and 12.51 minimum magnesium with a total neutralizing power in terms of calcium carbonate of 101.12 percent.

The company's specially designed spreader trucks can spread an 8-ton load in 20 min. The average quantity spread in southern Ohio is 2 tons per

acre. The spreader can be set to distribute at any desired rate from 500 lb. to 4 tons per acre.

General manager Yarger emphasizes the importance of keeping agricultural limestone dry before delivery. The new Melvin plant, he says, has been carefully designed to insure the delivery of agricultural limestone in a perfectly dry state which he says makes spreading easier and assures better penetration of the soil.

### Company History

Melvin Stone Co. is a three-way partnership consisting of the founder, C. C. Beam, Alice C. Beam, his wife, and W. V. Custis. Mr. Beam started the operation in 1919 with the idea of supplying stone for the waterbound macadam surface of the CCC highway then being built from Wilmington to Sabina. His principal equipment at that time consisted of a Tel-smith reduction crusher and a small gyratory. His entire working force was 20 men. The company now employs a force of 60.

Mr. Beam operated as an individual until 1929 when he organized C. C. Beam, Inc., with Alice C. Beam, the late Mrs. F. D. Custis and W. V. Custis. The company was reorganized as a partnership in 1941 after the death of Mrs. Custis.

In addition to Mr. Beam and general manager Yarger, key men now active in the organization include Hobart Matson, superintendent; J. O. Harris, production manager; S. H. Stewart, quarry foreman; W. M. Beckett, crusher plant foreman; Joseph Leaverton, distribution manager in charge of all shipments by rail or truck; Carl W. Taylor, storage yard foreman and P. J. Andrew, sales department.

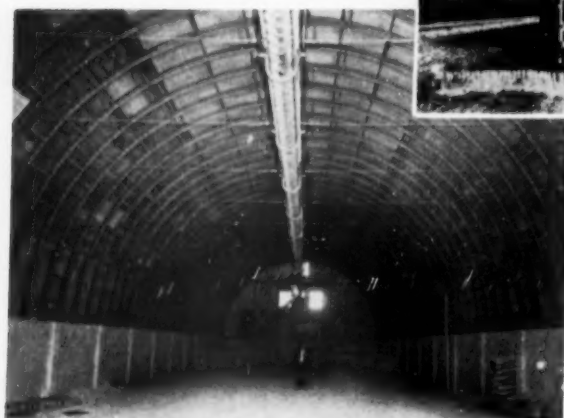
### Rod Mill Operation

A NEW SILENT 16 mm. Allis-Chalmers film, "Rod Action in a Rod Mill at Different Speeds," demonstrates in slow motion the rod action in a 30-in. x 8-ft. rod mill. The mill was operated at seven different percentages of critical speed, and painted stripes on the ends of each rod show the amount of rod rotation. By following an individual rod, patterns of the rod paths may be traced. The 30-min. movie is available for showing before technical and engineering groups, upon request to Allis-Chalmers Manufacturing Co., Advertising and Industrial Press Dept., General Machinery Division, Milwaukee, Wis.

### Aggregates Plant

KENNETH BLACK, Silver Falls, N.B., recently installed new equipment and began operation of his newly acquired sand and gravel and crushing plant near Silver Falls. New facilities include crushing and screening equipment, and loading and transportation facilities.

Screw conveyor discharges agstone evenly through tubes in rear of specially designed trucks



Interior of agricultural limestone storage building showing 185 ft. long screw conveyor suspended from the roof







Left: Quarry trucks waiting to unload limestone at the hopper. In the background a load is being tipped onto the conveyor belt under the hopper by a boom with cable and hook. Right: A semi-trailer combination being loaded with limestone by a power shovel. Throughout the quarry operation precautions must be taken with fuel because of extremely dusty conditions

## SOUTH AFRICA LIME PRODUCER TRIPLES PRODUCTION WITH TRAILER TRUCKS

**G**OLD MINES in the area around Johannesburg, South Africa, are receiving essential shipments of lime much faster now since a major supplier in the Cape province, the Union Lime Co., Ltd., augmented its quarry equipment with five combinations of International tractor-trucks and Easton semi-trailers, each able to carry 20-ton loads.

The new equipment is used to transport limestone from quarry face to crushers 1000 yd. away, at the company's quarries approximately 40 miles west of Kimberley, the internationally famous diamond city. In their first 16 months of operation, a total of 1,000,000 tons of stone, or a daily average of 3700 tons, was hauled by the four combinations that work each day.

Union Lime Co., Ltd., supplies lime and various lime products to gold mines, water filtration plants and sugar refineries in the province of Natal. Its deposits, which have been worked for 12 years, are noted for their high purity content—as much as 98 percent in some places.

Before the introduction of International trucks (Models KBR-11 with double reduction rear axles) working with trailers, the stone was hauled to crushers by 16-ton trolley cars drawn by mules, or attached to an endless rope driven by a steam capstan. This system proved unsatisfactory because the car tracks had to be moved each time the quarry face was blasted. Only 1000 tons of raw material could be hauled each 8-hr. shift,

while 5000 tons were required to maintain steady production.

A company decision to make cement from the material discarded in the production of lime led to the adoption of the truck-trailer operation. Since then these combinations have proved their ability to keep the crushers operating full-time. Each truck has moved 200,000 tons of stone since it was placed in operation and, in a recent month, a record of 76,420 tons was delivered to the crushers, ac-

cording to Denis Schierhout, quarry manager. This tonnage could be increased more if the crushers were able to handle the added volume, he said.

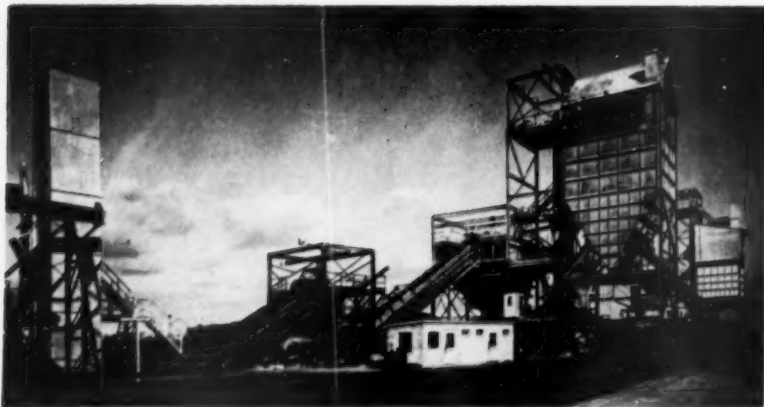
Another advantage of the equipment is its ability to resume loading only 30 min. after the rock has been blasted loose from the quarry face. Under the old system, considerable time had to be spent moving the trolley tracks back in place.

(Continued on page 107)

A major source of lime in South Africa, this quarry of Union Lime Co., Ltd., provides lime for gold mines, water filtration plants and sugar refineries in the province of Natal. The facilities also include a cement plant (right) and a lime and bagging plant (left). The trucks in the foreground are hauling limestone to the unloading hopper



# Lightweight Aggregate



World's largest lightweight aggregate plant, operated by Waylite Co. at Bethlehem Steel Co.'s plant at Bethlehem, Penn. Addition of a second unit (background) increased Waylite's annual output of slag aggregate to 700,000 cu. yd. at Bethlehem

Waylite Co.'s sixth producing plant at Bethlehem, Penn., has 75 cu. yd. per hr. capacity

By L. DAVID MINSK

## PRODUCING EXPANDED SLAG AGGREGATE

**A**NOTHER LIGHTWEIGHT AGGREGATE plant was unveiled by The Waylite Co., when on February 1 a 75-cu. yd. per hour expanded slag plant went into operation at Bethlehem, Penn., bringing to six the number of units the company has throughout the East and Midwest. Another plant, nearly identical to the new one (though it has 20 percent less screening capacity), was opened January 1, 1950, at Bethlehem. The older plant has a capacity of about 320,000 cu. yd. per year, operating three shifts a day. Both operations are located adjacent to the slag dump of Bethlehem Steel Co., from which the slag

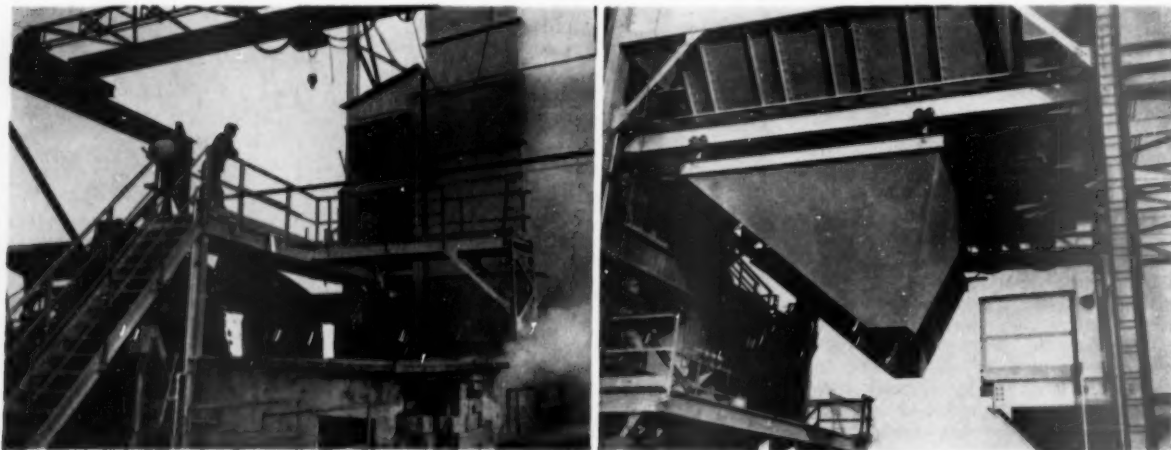
is purchased. The Waylite Co. demonstrated its Bethlehem slag operations to members of the board of directors and to past presidents of the National Concrete Masonry Association on a field trip during the N.C.M.A. convention in New York City in February.

### Material Flow

Expansion of slag into lightweight aggregate is basically a simple matter; the bulk of the \$650,000 investment in the new Bethlehem plant represents material handling equipment. The heart of the operation is the Brosius slag granulator. It is in this cast iron mixer, 8 ft. in diameter and

6 ft. high, that the molten slag is whipped and beaten as it is sprayed with water. Three tiers of rotating blades hit the slag as it drops down to a pan conveyor underneath, to be taken on cooling conveyors to a crushing and screening tower.

Slag is delivered to the Waylite plant in 400-cu. ft. ladles. Two of these ladles are on one railroad car. Ladle cars and all switching facilities are owned by Bethlehem Steel Co. Up to a half dozen cars are delivered to the slag plant at one time, and then The Waylite Co. spots them with its own car pullers and pours the ladles. Two ladles are poured simul-



Left: Ladles pouring slag. The control booth window is visible at upper center. Right: Collecting hoppers under the storage bins are movable along the I-beams visible at top of picture

## LIGHTWEIGHT AGGREGATE

taneously, this operation taking 12-15 min. Normally four to five double ladles are poured per hour.

The stream of water is directed at the slag as it flows into the top of the granulator or "beater." A half ton of water is used per ton of slag for cooling purposes. Of course this immediately changes to steam, but steam at 212 deg. F. still cools slag at 2000 deg. F. Much of this steam is drawn off by a natural draft stack alongside the granulator and over the pan conveyor.

Expansion of the slag is accompanied by a series of shotgun-like blasts as bubbles form in the plastic mass from entrained gases. Molten slag has a specific gravity of 2.65; the expanded slag has an apparent sp. gr. of 1.0-1.4. The revolving beater arms are on a shaft rotating at 200 r.p.m. With six bars on each of the three tiers of arms, the mass is broken up continually.

The material is still tacky when it drops onto the 5-ft. wide pan conveyor. On its 90-ft. trip to a breaker the material undergoes cooling and annealing. It is this annealing stage, the company states, that gives the material its tough, crystalline characteristics. The breaker at the end of the conveyor is a simple finger type which breaks the now hardened mass into 8- to 10-in. chunks to increase the rate of cooling. These chunks ride up a second 90-ft. long pan conveyor and drop into a 400-cu. ft. surge bin. Temperature of the slag upon leaving the beater is 1200 deg. F.; it is 400 deg. F. when it leaves the surge bin.

### Crushing

A third 3-ft. pan conveyor, 20 ft. between centers, transports the slag chunks to the primary crusher. This is a 24- x 40-in. double-roll (plain rolls) unit. Gruendler and Allis-Chalmers crushers are used in both Bethlehem plants. Discharge from the roll crushers is elevated in a bucket elevator to the top of the screen house. Two 4- x 12-ft. triple-deck screens are operated here in parallel. Screen sizes are  $\frac{3}{8}$  in.,  $\frac{1}{2}$  in., and  $\frac{3}{4}$  in. Oversize from the top deck is returned to a secondary crusher, a 24- x 30-in. double roll operating in closed circuit with the bucket elevator. Thus three sizes of aggregate are produced: coarse, plus  $\frac{3}{8}$  in. minus  $\frac{1}{2}$  in.; acoustical, plus  $\frac{1}{2}$  in. minus  $\frac{3}{4}$  in.; and fine, minus  $\frac{3}{4}$  in. Average fineness modulus of the fine material is 2.25.

Two bins under the screening tower are used to store 300 cu. yd. of coarse and fine aggregate. Acoustical grade Waylite is ground stockpiled, and when demand for the fine is greater than current production, this middle size is recovered and returned to a third roll crusher (24 x 30 in.) for recrushing. Demand has generally been 60 percent fine and 40 percent coarse.

Shipments from the Bethlehem



The control room overlooks the slag ladles and granulating machine. Plant is all-electric, with all controls centrally located before this one operator

plant are mostly by rail. Truck transportation is generally limited to a 30-mile radius. Both truck and rail car loading can go on simultaneously. Five men per shift operate each plant, exclusive of maintenance work. Three shifts are run. Maintenance is a large item in production costs, according to company management, for none of the

material is processed at temperatures much below 400 deg. F. In the slag beater, where the temperature is no lower than 1200 deg. F., the rotating blades take a beating—they must be replaced every week to ten days. Bearings throughout the plant must withstand some of the highest operating temperatures encountered in any industry.

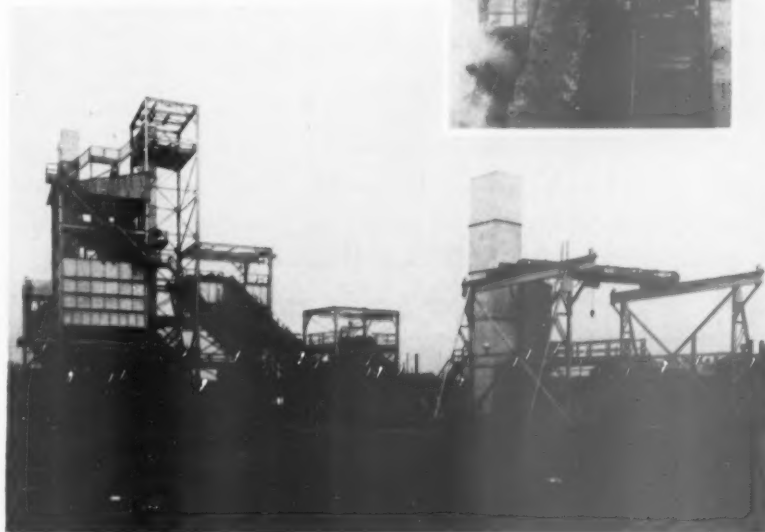
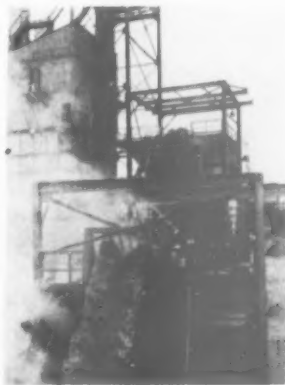
### Company History

The Waylite Co.'s other four plants, in addition to the two at Bethlehem, are at Chicago (where there are also two plants), and at Indiana Harbor, Ind., and Swedeland, Penn. (near Philadelphia). The company was organized in 1932 with one plant in Chicago, but the first sizeable production year was 1936. By 1940, annual production had reached 150,000 cu. yd. Following the war, production zoomed. Three new plants were placed in operation between 1946 and 1950, raising production to 920,000 cu. yd. in 1951. Company estimates for 1952 production range as high as 1,200,000 cu. yd.

### Officers

Officers of the company are E. A. Howard, president, and W. F. Potts, Paul M. Woodworth and Walter W. Warren, vice-presidents. Mr. Warren supervises both production at the Bethlehem plant and Eastern area sales.

Below: New unit put into operation by the Waylite Co. at the Bethlehem Steel Co. plant. The molten slag is poured to the granulator below grade at right. A pan conveyor carries the expanded slag to a finger breaker in the center structure; from there the lightweight material is conveyed to a surge bin at left center. The material is then crushed and elevated to the screening and storage bins at left. Inset: The expanded slag is carried on the 90-ft. pan conveyor (foreground) to a finger breaker, which breaks the material into 8- to 10-in. chunks. These drop to the second conveyor in the background, which discharges into a surge bin



## THERMODYNAMICS OF LIME MANUFACTURE

### Part V. Factors to be considered in design of lime kilns for best over-all economy

By RALPH GIBBS\*

WITH THE beginning of this article, the author can offer words of encouragement and cheer to those who, either with ease or with travail, have been following this series of articles. It may seem to have taken a long time and a roundabout way to attain our objective. But if you will review this series, you will find that each step taken has been in the direction leading us to a method for determining the most economical length of the rotary kiln. Although they are empirical, the necessary relations have been developed for the solution of this problem. And it is a problem of great economic significance.

It is doubtful that any two manufacturers of rotary kilns will recommend the same sized kilns for a specific job. Ten years ago it was popular to select the length of the kiln on

some obscure arbitrary rule relating the length to some multiple of the diameter. The author himself has been guilty of this practice. Despite this practice, there were some who favored a small ratio of length to diameter, while others favored extremely large ratios. There did not seem to be any common ground whereon these extremists could meet. Common sense tells us that the kiln with the larger ratio should recover more of the heat than the kiln with the smaller ratio. But at what length does the ratio exceed that for an economic balance?

As a result of this ignorance, some abnormalities have been manufactured and sold. It is hardly possible that our economic conditions ever have justified, or ever will justify, an 8-ft. dia. kiln 500 ft. long. National and world economy, for that matter, are too well harmonized to go so far out of balance. Industrial materials generally have values that rise and fall together so that their relative values

remain fairly constant. It is the exception and not the rule that will find some unusual kiln size requirement justified.

Of late years the trend has been toward longer kilns. The increased cost of fuel seems to justify this trend. But when we consider only the cost of fuel and ignore the cost of the additional kiln length, we may be fooling ourselves into a false sensing of the answer to the problem. Unless our judgment is tempered by facts, we are more likely than not to come up with an erroneous conclusion.

Problems of economics are complicated no end. It seems to delight the professional economist when he can make the problem so complex that it becomes obscure even to him. This talented and well-meaning individual has an unholy ally generally called an accountant. In the hands of these two individuals the average engineer or businessman will become so bewildered and utterly confused that the solving of an ordinary problem assumes the proportions of an insuperable task. This struggle for minutiae will have no part in our solution to the problem. The farmer doesn't need a micrometer to select his fence posts. The blacksmith doesn't need a pyrometer to determine the heat of the iron before he forges it. They use the simplest yet most effective means of accomplishing their objective. We will do the same in attempting a solution to the problem of determining the economical length of the rotary kiln. Once the method is available, the refinements can come when they will. We will leave to others the joy of searching and correcting to the tenth decimal. We will simplify rather than complicate.

No doubt the best manner of attacking our problem of fixing the economical length of the rotary lime kiln is to base the computations on the square-feet-equivalent of the kiln shell surface.

Furthermore, it will be impossible for the author to use exact cost figures in his examples, since these aren't available, nor are there any that will be applicable to every case. Nor will it be possible to satisfy all the prevailing ideas on the accounting methods that are possible, it is intended only to develop a method which will be generally

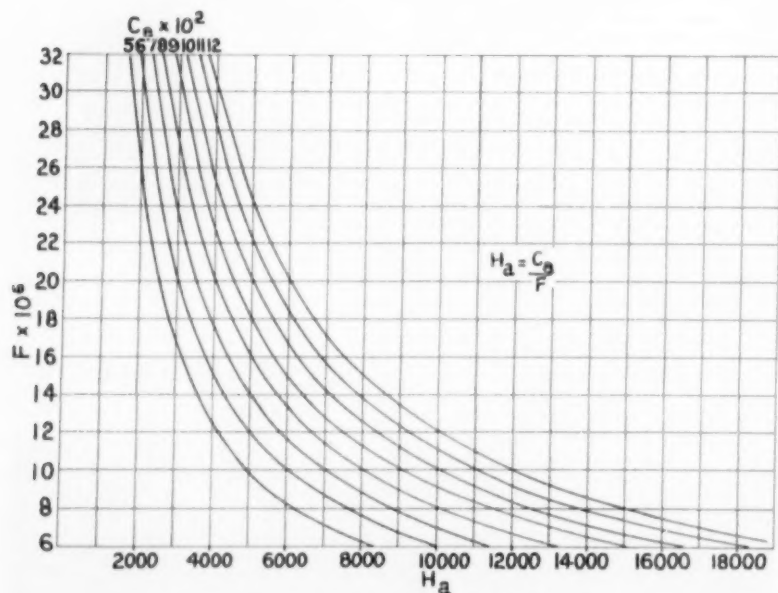


Fig. 1:  $H_a$  as a function of  $C_p$  and  $F$

\*Consulting engineer, York, Penn. (deceased).

This article is the fifth in a series on the thermodynamics of lime manufacture, published in *Rock Products*, February, 1950, page 118; June, 1950, page 122; October, 1950, page 110; and February, 1951, page 108.



applicable. The graphs and tables that will be presented will be in such forms that will be usable for any conditions that may prevail.

In a previous article (Part III, Oct., 1950, page 110), the writer developed empirical relations for the rate of heat transfer from the gases to the charge in the kiln in the different zones. Among them was that for determining the value of  $H_s$ , the B.t.u./hr./sq. ft. equivalent of kiln shell surface in any zone of the kiln beyond the flame zone. This relation is:

$$H_s = \frac{.043D^2 (572 + .56L_s) (L_s + L_a) (4700 + 1550D)}{L L_a L_s}$$

where  $D$  is the kiln shell diameter, in feet  
 $L$  is the kiln shell length, in feet  
 $L_a$  is any lineal kiln shell length, equal to or less than  $L$   
 $L_s$  is any lineal kiln shell length less than  $L_a$ .

All values of  $L$ ,  $L_a$ , and  $L_s$  are measured from the product discharge end of the kiln.

By using this relation, we are enabled to compute the rate of heat transfer from the hot kiln gases to each square foot equivalent of kiln shell surface, and which, in turn, will make possible the determination of the fuel cost equivalent of this heat.

The purpose of this evaluation is readily apparent. When the value of the heat transferred to some specific surface is greater than the cost of providing and maintaining this surface, then the cost of the surface is economically justified. When the value of the heat transferred to a specific surface is less than the cost of providing and maintaining that surface, then that surface is not economically justified. Therefore, the most economical length of the kiln will be that which provides, at the coolest end, a surface the cost of which just balances the fuel-cost equivalent of the heat transferred.

Thus, we are seeking:

$$H_s \times F = C_s$$

where  $H_s$  has the former dimension, B.t.u./hr./sq. ft.

$F$  is a coefficient to convert  $H_s$  to a cash value, cents/hr./sq. ft.

$C_s$  is the cost per hour for providing and maintaining this square foot equivalent of kiln shell surface.

The evaluation of  $F$  is not difficult. With coal delivered to the kiln at a cost of \$6 per ton of 2000 lb., its cost per pound is 0.3 cents. And if the heating value is 13,500 B.t.u./lb., then each B.t.u. costs 0.0000222 cents, or  $22.2 \times 10^{-6}$  cents.

Thus

$$F = \frac{\text{Cost per ton}}{2000 \times \text{B.t.u./lb.}}$$

With Bunker C oil delivered to the kiln at 6 cents per gal., then

$$F = \frac{6 \text{ cents}}{144,000 \text{ B.t.u./gal.}} = 43 \times 10^{-6} \text{ cents per B.t.u.}$$

$C_s$ , the cost of providing and maintaining a square foot equivalent of kiln shell surface, can be evaluated by

$$C_s = C_d + C_i + C_b + C_m + C_n$$

where  $C_d$  is the depreciation charge/sq. ft./hr.

$C_i$  is the interest charge/sq. ft./hr.

$C_b$  is the brick lining cost/sq. ft./hr.

$C_m$  is the maintenance cost/sq. ft./hr.

$C_n$  is the insurance and miscellaneous charge/sq. ft./hr.

Thus  $C_s$  is the operating cost per hour for providing and maintaining each square foot equivalent of kiln shell surface.

Simply as an example, and for purposes of illustration, the following development of a value for  $C_s$  is shown. It will be assumed that an 8-ft. x 125-ft. kiln is installed at a cost of \$100,000. It is to be depreciated in ten years. The interest charges are 5 percent. The brick lining in the coolest end costs \$2 per square foot and is replaced every five years. Maintenance charges are 1 percent of the kiln cost. Insurance and miscellaneous charges are 5 percent of the kiln cost.

The surface involved is equivalent to 3130 sq. ft. of kiln shell surface. Consequently:

$$\begin{aligned} C_d &= \frac{\$100,000}{10 \times 3130} = \$3.20/\text{sq. ft./yr.} \\ C_i &= \frac{.05 \times \$100,000}{3130} = 1.60/\text{sq. ft./yr.} \\ C_b &= \frac{\$2}{5} = .40/\text{sq. ft./yr.} \\ C_m &= \frac{.01 \times \$100,000}{3130} = .32/\text{sq. ft./yr.} \\ C_n &= \frac{.05 \times \$100,000}{3130} = 1.60/\text{sq. ft./yr.} \\ \text{Total} &= \$7.12/\text{sq. ft./yr.} \end{aligned}$$

There are 8760 hr. per year, so:

$$C_s = \frac{712 \text{ cents}}{8760} = .0815 \text{ cents/sq. ft./hr.}$$

Thus the hourly cost of providing and maintaining each square foot of surface in the zone being examined is 0.0815 cents. This standing charge is equivalent to 0.212 lb. of coal at \$6 per 2000 lb. And 0.212 lb. of coal having a heating value of 13,500 B.t.u./lb. is equivalent to 3660 B.t.u. This means that for an economic balance under the conditions postulated, the cost of the surface justifies a heat transfer rate of 3660 B.t.u./hr./sq. ft.

Computing the value of  $H_s$  from the above relation for the last 10-ft. section of the 8- x 125-ft. kiln, it is found to be 4200 B.t.u./hr./sq. ft.

With Bunker C, or No. 6, oil at 6 cents per gal., this 0.0815 cents is equivalent to 0.0136 gal. of oil per sq. ft. per hr., or 1900 B.t.u./sq. ft./hr.

From these figures, it is seen that, for the conditions assumed, this kiln, 8- x 125-ft., is not of an economical length. With coal firing, the cost of the surface justifies extracting the heat from the gases until the value of  $H_s$  equals 3660 B.t.u./sq. ft./hr. With oil firing, the surface cost justifies extracting heat from the gases until the value of  $H_s$  equals 1900 B.t.u./sq. ft./hr.

In order to have this data in comprehensive form, the tables and graphs presented here have been developed.

Values of  $H_s$  can be derived from the following relation wherein these values are determined from the physical dimensions of the kiln. Table II and Fig. 2 illustrate these relations.

Fig. 1 and 2 can be combined to simplify the solution to the problem

Table I. Values of  $H_s$  for different values of  $F$  and  $C_s$ ;  $H_s = \frac{C_s}{F}$

$F \times 10^6$	$C_s$	.05	.06	.07	.08	.09	.10	.11	.12
6	8350	10000	11650	13300	15000	16700	18350	20000	
8	6060	7500	8750	10000	11250	12500	13750	15000	
10	5000	6000	7000	8000	9000	10000	11000	12000	
12	4160	5000	5830	6660	7500	8320	9170	10000	
14	3570	4280	5000	5700	6430	7140	7870	8560	
16	3120	3750	4380	5000	5620	6240	6880	7500	
18	2780	3340	3890	4440	5000	5560	6120	6680	
20	2500	3000	3500	4000	4500	5000	5500	6000	
22	2270	2730	3180	3640	4090	4540	5000	5460	
24	2180	2500	2920	3330	3750	4160	4580	5000	
26	1920	2310	2690	3070	3460	3840	4230	4620	
28	1785	2140	2500	2860	3220	3570	3930	4280	
30	1668	2000	2330	2660	3000	3332	3670	4000	
32	1560	1875	2180	2500	2810	3120	3440	3750	
34	1470	1765	2060	2350	2650	2940	3240	3530	

Table II. Values of  $H_s$  computed from kiln dimension formula

$L$	Dia.	6	7	8	9	10	11	12
60	8060	12100	17400	24000	32200	40000	48500	55500
80	4500	6800	9750	13450	18000	22400	29800	35500
100	2900	4300	6250	8650	11600	14550	19150	23500
150	1300	1970	2820	3900	5220	6490	8650	10500
200	764	1150	1650	2280	3050	3780	5050	6050
250	502	755	1080	1495	2000	2480	3310	3910
300	366	550	790	1090	1460	1815	2430	2930
350	277	417	597	825	1105	1379	1830	2230
400	218	328	470	650	870	1080	1445	1750
450	180	270	387	535	717	890	1190	1450
500	147	214	317	438	587	730	970	1170
550	129	194	277	384	514	640	850	1020
600	109	164	235	325	435	540	720	870

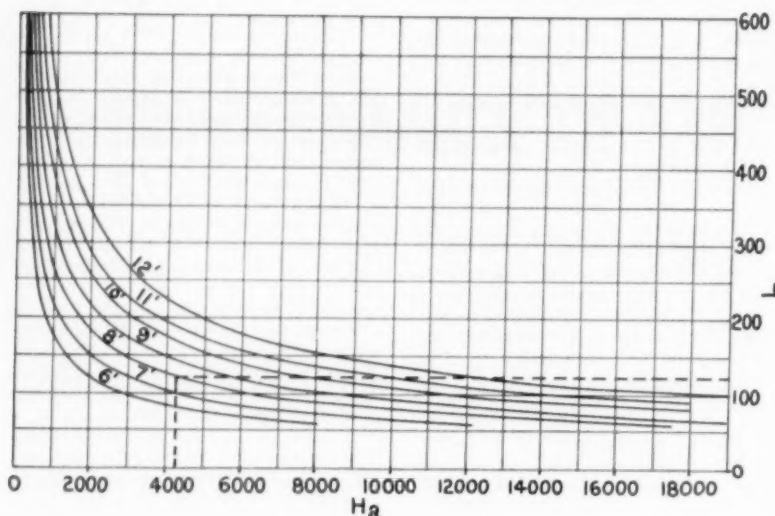
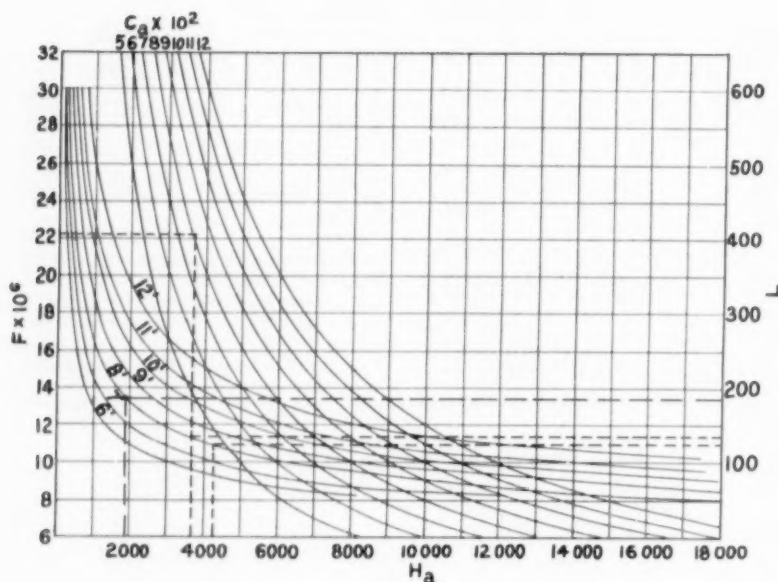
Fig. 2:  $H_a$  vs.  $L$  for different kiln diameters

Fig. 3: Combined graphs

and picture the analysis, and make the comparisons on one chart. Such a chart is shown in Fig. 3.

In Fig. 3 the analysis of the 8- x 125-ft. kiln is shown graphically. At  $F = 22.2 \times 10^6$  move horizontally to  $C_a$ , equals  $8.15 \times 10^2$ . This is shown in the dashed lines. Then drop vertically to  $H_a$ , where it is found to be about 4200 B.t.u./sq. ft./hr. Where this vertical dotted line crosses the 8-ft. dia. kiln curve will give the economical length of the 8-ft. kiln for the conditions assumed. In this case it is found to be about 135 ft., so the 125-ft. kiln is 10 ft. short of being an economical length. A 7½-ft. dia. kiln 125 ft. long would be about the economical size for this length under these conditions.

Thus it will be seen that the economical length of the kiln will depend upon the fuel cost, all other conditions remaining constant. When burning oil, which demands an  $H_a$  of 1900 B.t.u./sq. ft./hr., it is seen that the length of the kiln should be about 185 ft. to have its most economical length.

Any factors that tend to increase the value of  $C_a$  will favor a decrease in the length of the economical kiln. In the same way any factors that tend to increase the cost of the fuel will favor an increase in the kiln length. On the other hand, should the values of  $F$  and  $C_a$  increase or decrease in proportion, the economical length of the kiln will not be affected.

## High-Calcium Limestone Survey

THE BALTIMORE AND OHIO Railroad Co., Baltimore, Md., has released a publication concerning high-calcium limestone in the areas served by the B. & O. This attractive, loose-leaf book is over 100 pages in length and is profusely illustrated. The introduction presents general facts and definitions designed to assist the reader in understanding the report.

The book, for the most part, is devoted to a report organized according to the states concerned: Illinois, Indiana, Maryland, New York, Ohio, Pennsylvania, Virginia and West Virginia. The state descriptions deal with the limestone units which either actually or potentially contain high-calcium limestone deposits. Chemical composition of the deposits is clearly indicated. Division along state boundaries is arbitrary, of course, but this geographic arrangement is used because it is more familiar to most readers than an order based upon location of geologic formations. Further subdivision of states into counties is made wherever possible, and localities of promise, along the B. & O., are given special attention.

The appendices include data that are too abstract, or too technical, to be of general interest. There is a treatise on pertinent geology of limestone and comments on production, a discourse on high-calcium limestone uses, and a summary of stratigraphy, as well as a glossary and bibliography.

State geological survey organizations or equivalent agencies are the primary sources of information relating to the mineral resources of their respective states. However, the interpretation of data has largely been that of the author, John A. Ames, industrial geologist of the B. & O.

Questions, or requests for additional data, may be referred to the manager of industrial development, Traffic Dept., The Baltimore and Ohio Railroad Co., Baltimore 1, Md.; or to the industrial geologist at the same address.

## Sand and Gravel Plant

SELMAR CHRISTENSEN and Bob Ashby, Yankton, S.D., have announced plans to install additional equipment for their sand and gravel operations which they began last July. At present the depth of water at the point of operation in an old pit is about 25 ft., and 40 to 65 cu. yd. of washed sand and gravel are produced per hr. The gravel depth is estimated at about 170 ft., covering a wide area. Seven sizes of gravel and sand are produced. The installation of additional equipment will enable the company to supply much of the concrete aggregates for Gavins Point dam which will soon be under construction.

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removed with *Stody 1027* are good for double original life.



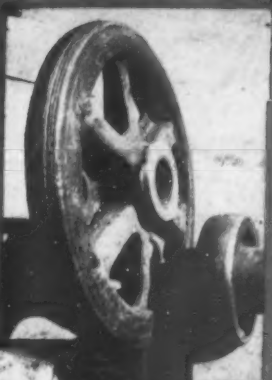
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need occasional stringer bands of *Stody Self-Hardening 21*. Stringers catch earth, form wear barriers.



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## IDLERS AND TRACK ROLLS

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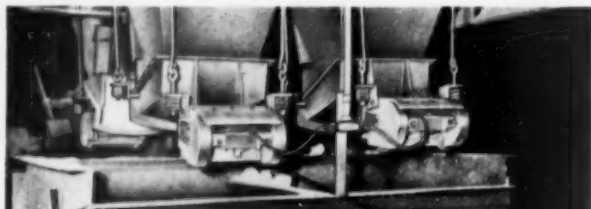
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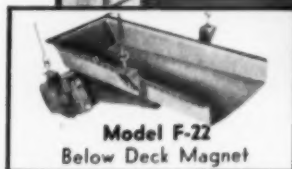
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Increase capacity and efficiency of coolers, driers, crushers, etc.



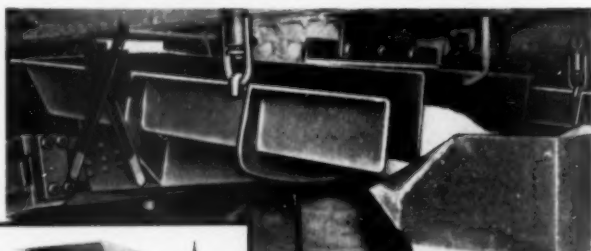
**FEEDING LIME**



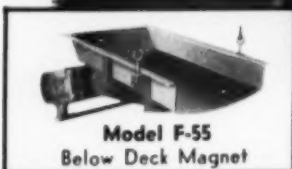
**Model F-22**  
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Four Syntron Light Tonnage Feeders, with capacities up to 25 tons per hour, discharge lime at the desired per tonnage rate into a four-compartment hopper in a vertical lime plant.

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## Mineral Aggregates Meeting

THE INDIANA MINERAL AGGREGATES ASSOCIATION held its annual convention at Indianapolis, Ind., March 13-14, 1952. Samples of the proposed new state highway 10M oil mat aggregates were on display. A discussion of these and other aggregates for secondary roads was given by Wayne R. Wooley, engineer of secondary roads, U.S. Bureau of Public Roads, Chicago, Ill. Dr. Charles F. Deiss, Indiana state geologist and chairman of the Division of Geology, Indiana University, presented a paper describing the various geological formations upon which Indiana's roads must be built and aggregates which should be used in their construction.

Other speakers included K. B. Woods, associate director, Joint Highway Research Project, Purdue University, who discussed trends in highway designs with special reference to the growing practice of using large quantities of granular materials to perform important functions in foundations and base courses, as well as in highway pavements and surfaces; Samuel C. Hadden, chairman of the State Highway Commission of Indiana, who discussed immediate problems and the current construction program of the Indiana State Highway Department; and Albert J. Wedeking, state highway commission, reviewed the problems incident to the building of Indiana's roads under the "pay-as-you-go" plan requirements of the state's constitution.

Mr. Wedeking stated that although the pay-as-you-go plan may seem unspectacular, it can also produce remarkable results. As an example, he pointed out that several years ago, attention was focused on the traffic hazard created because more than a thousand bridges on the state highway system were too narrow. By a program started in 1940, 412 of these hazards have been eliminated by relocating, reconstructing and widening the original structures at a cost of nearly \$25,000,000. Of these, 105 costing more than \$12,000,000 have been built in the last three years and 58 more, to cost \$5,000,000, are now programmed.

At the business session, an amendment to the by-laws was adopted which provides that past presidents shall become honorary members of the board of directors. Thus, Claude M. Herriman, president of Standard Materials Corp., Indianapolis, Ind.; F. W. Irving, president of Pipe Creek Stone Co., Marion, Ind.; and Earl L. Heckathorn, treasurer of Stuntz-Yeoman Co., Delphi, Ind., became the first honorary directors. Directors elected for the current year are C. A. Broecker, Newton County Stone Co., Kentland, Ind.; E. P. Holwadel, Ohio Gravel Co., Cincinnati, Ohio; K. K. Irving, J & K Stone & Gravel Inc., Muncie, Ind.; M. G. Johnson, The Merom Gravel Co., Indianapolis, Ind.;



J. R. Miller, Kickapoo Sand & Gravel Co., Peru, Ind.; Claude Monce, Meshberger Bros. Stone Corp., Linn Grove, Ind.; C. H. Purdum, Jr., Sturm & Dillard Gravel Co., Inc., Syracuse, Ind.; R. L. Roper, Harris City Stone Co., Inc., Greensburg, Ind.; R. E. Ward, The Francesville Stone Co., Francesville, Ind.; and George Wheeler, Kirkpatrick Gravel Co., Cambridge City, Ind.

Officers elected for 1952 are K. R. Misner, Western Indiana Gravel Co., Lafayette, Ind., president; C. W. Sniff, American Aggregates Corp., Indianapolis, Ind., vice-president; Roger Meshberger, Meshberger Stone Co., Inc., Columbus, Ind., secretary-treasurer; and Ralph E. Simpson, Indianapolis, Ind., engineer-director.

The convention closed with a luncheon for those interested in agricultural limestone, at which Robert M. Koch, executive secretary, National Agricultural Limestone Institute, Washington, D.C., was the special guest.

### Asbestos-Cement Facing

THE NATIONAL BUREAU OF STANDARDS recently issued Buildings and Structure Report 123 on "Fire Tests of Wood-Frame Walls and Partitions with Asbestos-Cement Facings," written by Nolan D. Mitchell.

The information presented in the report is intended to aid building authorities and regulatory agencies in evaluating the fire-resistance characteristics of these types and give the prospective builder a basis for the selection of construction that will meet given requirements with respect to fire resistance.

The tests of partitions sheathed with gypsum board over which  $\frac{1}{8}$ -in. asbestos-cement sheets were applied gave the best results in the test series. Such construction with  $\frac{1}{8}$ -in. gypsum board gave a fire-resistance rating of one hour and withstood the hose-stream test after 45 min. fire exposure. Similarly, a partition with  $\frac{1}{2}$ -in. gypsum-board sheathing and faced with  $\frac{1}{8}$ -in. asbestos-cement sheets, provided a rating of 1  $\frac{1}{4}$  hrs. as a loadbearing wall, or 1  $\frac{1}{2}$  hrs. as a non-loadbearing wall.

The partitions with facings of asbestos-cement sheets over gypsum-board sheathing had somewhat greater fire resistance, as determined from limiting rise of temperature on the unexposed face, than partitions with gypsum lath and plaster facings of approximately the same thickness, whose fire resistance had been previously established.

Copies of the report may be obtained from the Superintendent of Documents, U.S. Government Printing Office, Washington 25, D.C., for \$1.5 ea.

### Moves Offices

MATERIAL SERVICE CORP., Chicago, Ill., has announced the removal of its general offices from 33 N. LaSalle St., to its own building at 300-308 W. Washington St.



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USER: U.S. Steel Company--

McDonald, Ohio, slag dump.

INSTALLATION: 4 Euclid 15-ton rear dumps  
powered by GM 6-71 Diesels. 2 Haiss loaders  
powered by GM 3-71 Diesels. Allis-Chalmers

HD-5 tractor powered by GM 2-71 Diesel.

PERFORMANCE: Each of the engines in the  
Euclids has operated 11,000 hours to

date without overhaul.\* 3 Euclids  
hauling to crusher handle 2100 tons

per 10-hour day on 500 to 1000-yd.  
haul cycles.\*Piston rings

replaced in 3 engines at 10,000 hours.



# THIS DIESEL has worked 11,000 hours without overhaul

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# INFORMATION

TO HELP YOU MEET TODAY'S PROBLEMS AND TO MAKE PLANS FOR TOMORROW

You can obtain catalogs listed on these pages by merely checking and mailing the coupon below

- 1 **BASEMENTS**—Medusa Portland Cement Co. has released a 28-page catalog, describing and illustrating methods to make basements dry, beautiful and livable. The company's lines of paints, waterproofing powders and pastes, and waterproofed portland cement are discussed. Many suggestions for floor plans are included.
- 2 **BEARINGS**—Anti-Friction Bearing Distributors Association has announced that the "AFBDA Bearing Maintenance Report," published during the past year by the association, is being offered again during 1952 to interested individuals in industry as a service. The booklets concentrate solely on the many and varied problems of maintenance of anti-friction bearings.
- 3 **BELT DRIVES**—The Rubber Manufacturers Association, Inc. has announced a 16-page manual of recommended "Engineering Standards for Multiple V-Belt Drives." The standards may be obtained at a cost of \$1 for two copies from either the Multiple Drive Association, 7 W. Madison St., Chicago 2, Ill., or The Rubber Manufacturers Association, Inc., 444 Madison Ave., New York 22, N.Y.
- 4 **BELTING**—New York Belting and Packing Co. has published a catalog on conveyor and elevator belting, with the necessary data to lay out a drive or specify a belt. Complete tables on carrying capacities, horsepower factors, pulley diameters and other engineering information are included.
- 5 **BELTS**—Raybestos-Manhattan, Inc., has issued Bulletin 6830B, describing its improved Manhattan single-groove V-belts. New standardized belt numbers and a list of standard sizes of belts are included.
- 6 **BLENDING**—Hewitt-Robins Inc., Robins Engineers Div. has brought out bulletin No. 152, a 16-page well-illustrated booklet on the subject of materials blending. The publication surveys the topic thoroughly, and points out how the proper blending of materials can effect improvements in practice, efficiency and productivity.
- 7 **CHAINS**—Taylor-Wharton Iron & Steel Co. has released Bulletin No. 552, describing Tisco manganese steel dragline bucket chains. Dimensions and weights of the types of chains are listed.
- 8 **CHARGERS**—Motor Generator Corp. has issued a 6-page folder describing and illustrating its complete line of Hobart automatic motor generator chargers for industrial trucks. Fundamental principles and theory of operation are explained, and various installations are pictured.
- 9 **CLASSIFIERS**—Charles E. Wood Co. has issued a 4-page bulletin, No. 81, describing the principles of the Auto-Vortex classifiers together with some of their applications in recovering fine sand or producing specification fine aggregate.
- 10 **CLUTCHES**—Twin Disc Clutch Co. has announced the publication of its basic industries issue of "Production Road," which describes and illustrates practical applications of equipment using Twin Disc clutches, hydraulic drives and torque converters.
- 11 **COMPRESSED AIR**—Compressed Air and Gas Institute has prepared a catalog entitled "Compressed Air Power in Construction," covering the uses of compressed air in conveying, cement spraying, drilling, hoisting, rock drilling, etc. The pamphlet describes and illustrates air-operated tools used in these construction phases and presents methods for measuring performance of the equipment.
- 12 **CONTROL UNIT**—Minneapolis-Honeywell Regulator Co. has released a 2-page sheet, No. 175, giving engineering specifications of the Brown Electronik strip chart pneumatic control potentiometer. Photographs and diagrams are included.
- 13 **CONVEYORS**—Fuller Co. has issued Bulletin FH-2, describing and illustrating its F-H Airlaid conveyors. Complete specifications, diagrams, sketches and cutaways are included in the 8-page release.
- 14 **CONVEYORS**—Stephens-Adamson Manufacturing Co. has announced the release of Bulletin 199 of the "S-A Conveyor" series. Included in the booklet are 20 pages of illustrated articles covering actual field applications of the firm's conveyors.
- 15 **CONVEYORS**—The Brady Conveyors Corp. has issued a Flo-Veyor bulletin, on the handling of dry granular materials such as sand, cement, powders, grains, etc., in batches from one point to another. Diagrams and operating features are included in the release.
- 16 **CRANE**—Bucyrus-Erie Co. describes its all-hydraulic Hydrocrane in a 24-page booklet, which illustrates the machine's versatility in doing many types of jobs.
- 17 **DIESEL ENGINES**—Nordberg Manufacturing Co. has released Bulletin 194. This 12-page publication illustrates and describes the Nordberg 1-, 2-, and 3-cylinder Type 4FB diesel engines.
- 18 **DUST COLLECTORS**—American Wheelabrator & Equipment Corp. has published a 36-page catalog, No. 72-B, entitled "Dust and Fume Control," which describes the various sizes and models of cloth-type Dustube collectors. Descriptions are accompanied by complete specifications, construction drawings, cutaway views, and illustrations of typical installations.
- 19 **DUST FILTER**—The W.W. Sly Manufacturing Co. has issued Bulletin No. 101, describing the operation of the Sly Dynacloth cloth-type filter for many industrial applications.
- 20 **EARTHMOVERS**—Caterpillar Tractor Co. has issued a 16-page booklet, "Standardization—Key to Economy," illustrating and describing the benefits of standardization of products in the use of earthmoving equipment and diesel power. This booklet, Form 30243, contains many photographs and specifications.
- 21 **ELECTRIC POWER DRIVES**—Sterling Electric Motors, Inc., has announced publication of a 20-page comprehensive catalog of electric power drives. The booklet contains information on variable speed drives, geared motors and constant normal speed motors of various design.
- 22 **ELECTRICAL CABLE**—United States Rubber Co. has issued a 52-page engineering catalog on its line of electrical wires and cables for the coal mining industry but applicable to all industrial minerals industries. The booklet includes complete performance and specification data on insulation and jacket compounds, portable cords and cables with a voltage rating up to 3000 volts. Other wire products, and data on splicing and patching, current carrying capacities, conductor resistance (temperature correction factors and formulas for determining ampères are also incorporated in the booklet.
- 23 **ELECTRICAL EQUIPMENT**—General Electric Co. has published Bulletin GEA 8748, a 12-page release which outlines a six-point program for producing controlled quality cement. The release describes electrical equipment used for the modernization of cement plants.
- 24 **ELECTRICAL MAINTENANCE**—Westinghouse Electric Corp. is making available a booklet on safety rules for electrical maintenance and construction workers. This is section 27 of Westinghouse Hints on Electrical Maintenance.
- 25 **ELECTRODES**—Hobart Brothers Co. has released a pocket-size booklet "Hobart Welding Electrodes and Welders' Vest Pocket Guide," giving information on metals and electrodes, types of electrodes and joints, standard steel shapes, average electrode consumption and reference information.

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- 26 **ELEVATOR**—American Hoist and Derrick Co. has issued Catalog No. 250-E-1, illustrating and describing the new features designed into its portable material elevator. The 8-page bulletin is profusely illustrated.
- 27 **ENGINES**—Caterpillar Tractor Co. has published a 28-page service booklet, Form 30246, entitled "Small Engine Maintenance Guide." This booklet, in cartoon style, covers maintenance facts which apply to the six smaller sizes of Caterpillar diesel engines, marine engines and electric sets.
- 28 **FANS**—Standard Electric Manufacturing Co. has issued a 24-page catalog, describing and illustrating its ventilating fans, air circulators, belt-driven exhaust fans, floor and window fans, etc. Complete specifications are featured in the publication.
- 29 **FEEDERS**—Pioneer Engineering Works has published a 20-page booklet (Form No. 530) covering its complete line of manganese steel feeders for mines, cement mills and quarries. The booklet explains in detail the physical characteristics of these feeders and gives operating data, including capacities, horsepower and dimensions to enable the proper selection for every type of installation.
- 30 **FORK TRUCK**—The Baker-Raulang Co. has released an 8-page bulletin, No. 1327, showing all the important construction and operating features of the Baker type FS 2000-lb. fork truck. Photographs and complete construction details describe the major components of the truck, and dimensions and specification sheets contain complete engineering information.
- 31 **GAS ANALYZER**—Minneapolis-Honeywell Regulator Co. has announced the release of Instrumentation Data Sheet 10.15-3a, describing the Davis indicating and recording flue gas analyzer, which utilizes a Davis analyzer in combination with a Brown Electronik recorder.
- 32 **GRINDING MILLS**—Allis-Chalmers Manufacturing Co. has published a 44-page bulletin, No. 07B6718A, with engineering data on grinding mills for the rock products and other industries. Six separate types of grinding mills, with data on parts specifications, dimensions and capacities, are covered in the bulletin.
- 33 **INDUSTRIAL INSTRUMENTS**—Minneapolis-Honeywell Regulator Co. has released Catalog No. 5000, describing and illustrating the principal instruments, control devices and related components manufactured by the industrial division. Specifications of approximately 100 instruments are outlined.
- 34 **INSTRUMENTS**—Wheelco Instruments Co. has released Bulletin PI-2, which lists and describes its complete line of cabinet type instrument panels. Full specifications and prices are included in the publication.
- 35 **LIFT TRUCKS**—Towmotor Corp. has released an illustrated booklet, No. SP-10, providing basic product information on its line of fork lift trucks. The booklet is a nontechnical analysis of the construction features of Towmotor equipment.
- 36 **LINERS**—Thomas Foundries, Inc. has published a 4-page pamphlet covering its line of Ni-Hard mill liners for the mining and cement industries. Complete descriptions and photographs are shown in the publication.
- 37 **LUBRICATION**—The Farnal Corp. has announced its bulletin "Studies in Centralized Lubrication" for 1952, which describes and illustrates the company's line of lubricating systems.
- 38 **MATERIAL HANDLING**—Webster Manufacturing, Inc. has published a catalog, celebrating its 75 years of service to the industry. A historical review is included, along with descriptive data, colored drawings and photographs of all of the company's equipment.
- 39 **MILLING MACHINERY**—The Mine and Smelter Supply Co. has announced the publication of Catalog 108-B on ore milling machinery. The 64-page booklet covers company products, and equipment not manufactured by, but available through, the company. Photographs and specifications are given for each piece of equipment.
- 40 **MOTORS**—Allis-Chalmers Manufacturing Co. has released Bulletin 05B7542A, on its large squirrel-cage induction motors. A cutaway view, showing construction features; diagrams; and photographs are pictured in the publication.
- 41 **MOTORS**—Electric Machinery Mfg. Co. has made available a reprint of a paper entitled "Application of Direct-Connected Synchronous Motors to Reciprocating Compressors," which was presented at a New York meeting of the American Institute of Electrical Engineers by G. L. Oscarson, chief application engineer of the company. The discussion deals largely with consideration of proper rotor fly-wheel effect (WK<sup>2</sup>) as a preventive measure for voltage fluctuations when driving reciprocating compressors with direct-connected synchronous motors. This is a 12-page article, publication No. 1200-TEC-111.
- 42 **PIPE COATING**—Hamilton Kent Manufacturing Co. has released Bulletin R-2, describing the properties and uses of ReXon coating No. 2, a chemically resistant concrete pipe coating. Full details are given in the 4-page bulletin.
- 43 **POWER**—Electric Machinery Mfg. Co. has released "E-M Synchronizer" No. 35, the company's quarterly publication, which features an article on standby or emergency power. Included in the bulletin are a detailed discussion of controls for automatic start-stop operation, diagrams and typical installation pictures.
- 44 **PUMPS**—Lawrence Machine and Pump Corp. has announced the publication of Bulletin 251, which describes its line of vertical pumps. Photographs, cutaway views and diagrams are included for each pump.
- 45 **RUBBER**—Pioneer Rubber Mills has announced its house organ, "Rubber Yarns," which is published six times a year. This magazine contains timely articles and photographs of the company's rubber operations and products.
- 46 **SAMPLER**—The Galigher Co. has issued catalog 51-S, describing sampling principles and the Geary-Jennings line of samplers for product control.
- 47 **TANKS AND TRUCKS**—The Heli Co. has published a commemorative booklet announcing the company's fiftieth anniversary. Seven pages are devoted to the firm's product lines, including: transport and storage tanks, road machinery, trucks and hoists, etc. The remaining 13 pages cover company history, policy and facilities.
- 48 **TRUCKS**—Yale & Towne Manufacturing Co. has released a 16-page bulletin, No. P809, describing the application, types and operating features of its line of motorized hand trucks and electric stackers. A special section shows various attachments for handling of objects without pallets.
- 49 **VENTILATION**—Mine Safety Appliances Co. has issued a 4-page bulletin, No. DP-5, on the M.S.A.-Lamb Air-Mover, a portable device for moving volumes of air in intermittent or emergency ventilation.
- 50 **WELDING ROD**—Rankin Manufacturing Co. has announced Bulletin C-X, in which is described Ranite "C-X" hard-surfacing welding rod. Use data and actual test results are contained in the release.
- 51 **WIRE ROPE**—Macwhythe Co. has brought out catalog No. 5201, entitled "Macwhythe Safe-Lock Industrial Standards Wire Rope Assemblies." The catalog illustrates and gives detailed specifications for wire rope with fittings permanently attached. Applications are described, for operating controls, as a part of machinery, and for slings and hoists.

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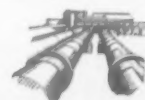
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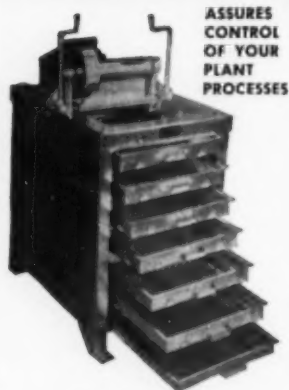
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## KENTUCKY STONE PRODUCERS MEET

**M**EMBERS OF THE Kentucky Crushed Stone Association who attended the 9th annual convention held in Louisville, March 29, heard talks on a variety of subjects, including events in Washington and the problems of crushed stone rejection. Attendance was approximately 200.

The convention opened with a meeting of the board of directors, followed by a luncheon. President Martin T. Smith, Frankfort, called the first general meeting to order. First on the agenda was a showing of the General Motors' film "Let's Get Out of the Muddle."

Robert M. Koch, executive secretary, National Agricultural Limestone Institute, Washington, D.C., discussed developments on the Washington scene of interest to limestone producers. Mr. Koch went over recent events in the capital pertaining to the limestone industry and explained them. He devoted much of his talk to the subject of percentage depletion allowances.

### Reducing Rejected Material

This was followed by a talk entitled "Some of the Reasons for Crushed Stone Rejections," by David L. Arnall, geologist, Division of Materials, Kentucky State Highway Department. He stated that, in his opinion, the main difficulties the industry has at present are dirt, shale, gradation and mudballs. Segregation, Mr. Arnall claimed, is one of the main causes of failure. Although space is a problem, stockpiles are often much too high, resulting in the mixing of different sizes of stone. No. 6 and No. 10 sizes, he remarked, seem particularly troublesome since they are often

side by side, and one size gets in the other or employees confuse the piles and dump into the wrong one. Other matters for more careful supervision, he said, are blasting and breaks in the size of screen.

Mr. Arnall acknowledged that Kentucky has a lot of shale, but that the state certainly had no monopoly. He recommended that the shale be picked out before it gets to the crusher.

The problems of personnel were also touched on. They are frequent these days, Mr. Arnall said. And one of the biggest headaches is trying to keep employees from dumping into the wrong pile. The best thing in this case, he suggested, is to have an inspector check as stockpiling is done.

As for the future, Mr. Arnall pointed out the growing demand for high calcium limestone. "Steel plants, chemical plants, and many other industries," he declared, "are requiring an ever-increasing amount of it." He concluded, "Kentucky has a very plentiful supply. The outlook is bright."

### Officers

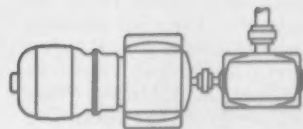
Officers for 1952 were elected. W. E. Covington, Ashland, was elected president, succeeding Martin T. Smith, Frankfort. Others elected were: David Bassett, Monticello, vice-president; J. Robert Thompson, Frankfort, treasurer; James B. Allen, Winchester, secretary; and W. O. Snyder, Frankfort, executive secretary. Directors elected at the meeting include W. B. Paynter, Jr., Middlesboro; Margaret McD. Smith, Lexington; W. B. Stone, Princeton; R. S. Waters, Elizabethtown; and Charles Gorman, Flemingsburg.



Newly-elected officers and directors of Kentucky Crushed Stone Association. Front row (l. to r.) Robert Thompson, Frankfort, treasurer; W. E. Covington, Ashland, president; Margaret McD. Smith, Lexington, director; David Bassett, Monticello, vice-president; and James B. Allen, Winchester, secretary. Back row (l. to r.) Martin T. Smith, Frankfort, retiring president; Raymond A. Matthews, Louisville, director; W. B. Paynter, Jr., Middlesboro, director; W. O. Snyder, Frankfort, executive secretary; W. B. Stone, Princeton, director; R. S. Waters, Elizabethtown, director; and Charles Gorman, Flemingsburg, director

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High-ratio reduction with right-angle takeoff?

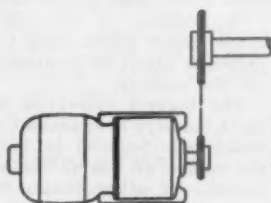


Get a LINK-BELT Worm Gear Drive

Reduction ratios: 3.1:1 to 8000:1. Torque: 1400 to 123,000 in. lbs. Output shaft rpm: 0.22 to 564. Drawing shows motorized P.I.V. variable speed and worm gear drives direct-coupled.

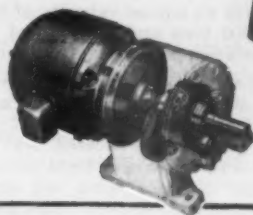


Restricted space for mounting?

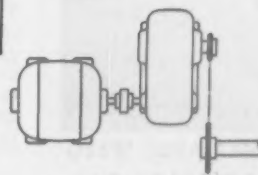


Get a LINK-BELT Gearmotor

Reduction ratios: 6.2:1 to 292:1. Hp range: 1 to 30. Output shaft rpm: 6 to 280. Drawing shows gearmotor with roller chain drive.

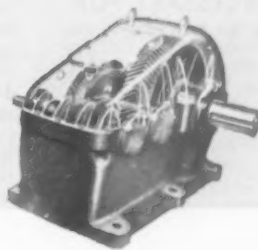


High hp with parallel shaft takeoff?



Get a LINK-BELT Herringbone Gear Drive

Reduction ratios: 2.84:1 to 318:1. Hp range: 1/2 to 1000. Output shaft rpm: 2 to 600. Drawing shows motor with herringbone gear and roller chain drives.



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**N**O LONGER need speed reduction be the limiting factor in a design or application problem. Because no *one* speed reducer solves every reduction problem, Link-Belt builds all three—Helical, Herringbone and Worm. Now it

is only necessary to choose the right type of Link-Belt enclosed gear drive . . . and select the hp and reduction ratio that fit your requirements. You can get complete engineering information from the Link-Belt office near you.

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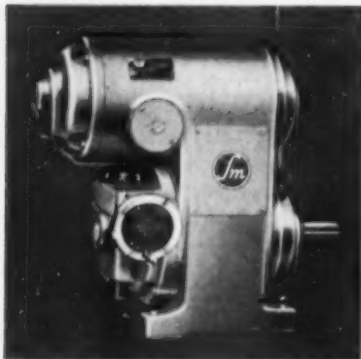
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**Equipment adaptation to:** Sequence synchronization — operators' abilities — load variations due to differences in quantity, quality, weight, size, tension, hardness or shape of material to be processed, machined, conveyed, blended, mixed, etc.

**Process control of:** Temperature—viscosity—level—pressure—flow—etc.

**Time control of:** Baking—drying—heating—cooking—pasteurizing—soaking—chemical action—etc.

With Speed-Trol you get the maximum in production, plant efficiency, quality & profit.

70 ILLUSTRATIONS showing how Sterling Electric Power Drives reduce production costs. Write for Bulletin No. A 115

# STERLING

ELECTRIC MOTORS

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## Cement Production Overseas

**ANGOLA:** Construction of a cement plant on the eastern shore of Lobito Bay, by the Companhia de Cimentos de Leiria of Portugal, provides a new industry for the colony. Complete cost of building and installation was estimated at \$3,500,000. The major part of the equipment was supplied by a New York firm. The prevailing price of imported cement in Lobito has been approximately \$31.50 per ton and it is believed that the price of the domestic product will be at the same level. Cost of production is estimated at \$9.00 per ton. The raw material to be utilized is the marine Cretaceous limestone from the upper Albian formation extending along the coast.

**BELGIAN CONGO:** Cimenteries d'Albertville has started construction of a cement plant at Kabimba (near Albertville) which will have an annual capacity of 36,000 tons. Production is expected to begin in the first quarter of 1953. Cement has been in extremely short supply in both Katanga and Kiva provinces. A fourth kiln was recently placed in service at Lubudi, but the cement supply is still inadequate to meet local requirements. A new plant being built at Kakontwe will have an annual capacity of 25,000 to 30,000 tons and is expected to be in operation sometime this summer.

**JORDAN:** In 1951, the Jordan government signed a contract with a German firm for construction of a cement plant, to be located near Salt. The plant, which will have an annual capacity of 60,000 tons, will cost approximately \$2,520,000. The government is to pay half, with remainder to be raised from private capital. The plant is scheduled for completion by the end of 1952.

**SWEDEN:** Portland cement was first manufactured in Sweden in the 1870's and, since that time, has developed into an important Swedish industry, which has been able not only to meet domestic requirements, but also to sustain a relatively large export trade.

The basic raw material, limestone, is found in abundant quantities in the country. The largest deposits are on the islands of Gotland and Oland and also in other parts of southern and central Sweden. The cement industry, which is the largest consumer of limestone, consumes 3-5 million tons per year, which is over half of the total output of limestone in Sweden. The chief obstacle of the cement in-

dustry is its dependence upon imported fuels. The high coal prices in recent years have compelled a partial shift-over from coal to oil.

The location of the cement plants has been greatly influenced by considerations of economy in transportation. The transportation of cement from plant to consumer was said to account for nearly 20 percent of the selling price, so in recent years every effort has been made to locate the cement mills close to major marketing areas. Since water transportation is usually the most economical, most plants have been located on shipping routes. The center of the industry which was formerly in south Sweden, has now been moved much farther north.

The manufacture of cement in Sweden is at present carried on by the eight firms listed in the table below.

In addition to the plants listed below, retail plants have been established at about 30 locations throughout the country.

The biggest enterprise in the cement industry is Skanska Cement AB, which was founded in 1871 and, in the course of years, has absorbed a number of other firms. Besides its operations at Limhamn, Hellekis, Koping and Stora Vika, it also has a subsidiary, the Slite Cement och Kalk AB. Together with this subsidiary, it accounts at present for approximately 85 percent of the total Swedish production of cement. In 1950 production amounted to over 1,900,000 tons and was estimated at over 2,000,000 tons for 1951.

Cement exports have fluctuated considerably. In 1949, 1950 and 1951 export figures were approximately 280,000, 250,000 and 300,000 tons respectively, compared with only 48,000 tons in 1938 and 144,000 tons in the previous peak year of 1929.

To meet the rising demand for cement both at home and on the export market, expansion projects are being carried out at several plants which will increase Swedish cement output by 450,000 tons annually. During the next two or three years, the capacity of the Limhamn works is to be increased by 150,000 tons per year; the Hellekis works by 180,000 tons; Degerhamn by 10,000 tons; the Gullhogen works by 100,000 tons; and the Slite works by 150,000 tons.

These reports were taken from *Mineral Trade Notes*, published by the Bureau of Mines.

	Production began in	No. of workers	Capacity per year in tons (clinker)
Olands Cement AB, Degerhamn	1887	200	90,000
Skanska Cement AB, Limhamnsfabriken, Limhamn	1890	600	300,000
Skanska Cement AB, Hellekisfabriken, Hellekis	1892	400	200,000
Slite Cement och Kalk AB, Slite	1919	350	355,000
AB Gullhogens Bruk, Skovde	1924	200	225,000
Hidinge Kalkverk AB, Lanna	1932	50	20,000
Skanska Cement AB, Kopingsfabriken, Koping	1941	250	280,000
Skanska Cement AB, Stora Vikafabriken, Stora Vika	1949	200	300,000
Total		2250	1,780,000



## Rocky's Notes

(Continued from page 53)

wishing to be heard were to have filed notices that they wish to appear by May 15. Written statements may also be filed—in sextuplicate!

Producers, of course, may also protest to their Congressmen. They may be interested too in a proposal to amend the Walsh-Healey Act itself which has been introduced in the Senate by Senator Fulbright of Arkansas. This would put a check on the Labor Department by making all Walsh-Healey Act proceedings subject to the Administrative Procedure Act and the Secretary of Labor's determinations and orders subject to attack in the courts. The amendment would also require the "open-market" exemption of the act to be applicable to such materials and supplies as are usually sold in the open market, whether or not the government buys them on the open market or by bids. The Secretary of Labor is said to have nullified this exemption in practice by making practically all purchases on a bid basis.

## Labor Relations Trends

(Continued from page 55)

work week, plain and explicit language would have been used to that effect."

### Contract Provisions

The relevant labor contract provisions read as follows: "The regular work weeks shall be established by the company and shall average not less than 42 hr. per week over periods of four weeks. An employee who has worked overtime shall not be laid off during the remainder of the week for the purpose of offsetting such overtime.

"The management of the company and the direction of the working forces, including the right to plan, direct and control company operations, to hire, suspend, or discharge for cause, or transfer, to relieve employees from duty because of lack of work for other legitimate reasons . . . are vested exclusively in the company; provided that, in the exercise of these prerogatives the company shall not violate the provisions of this agreement. . . .

"Adequate procedure having been provided for the equitable settlement of any grievance arising under this agreement, the parties hereto agree that there shall be no suspension of work through strikes, slow-downs, lockouts, or otherwise, during the life of this agreement.

"Any arbitrator selected or appointed under this paragraph shall have jurisdiction and authority to interpret and apply the provisions of this agreement insofar as it shall be necessary to the determination of the grievance before him, but he shall have no jurisdiction or authority to

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**you PAY**  
Less than  
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(less truck and mounting charges, F.O.B. Waverly, Iowa. Price subject to change)

**you GET**

- ✓ **Complete dragline unit**  
including standard 25' boom, drag bucket, fairlead and 1000 lbs. additional counterweight.
- ✓ **90 yds. per hr. output**
- ✓ **10,000 lb. lift capacity**
- ✓ **High speed mobility**
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to crane, clam, pile driver, grapple, magnet, shovel, or back hoe (attachment extra).



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**The LOW-COST machine with the BIG earning range**



**MORE YARDAGE  
LESS LABOR  
LARGER PROFITS**

Here is a Sauerman Slackline Cableway supplying a screening plant with 225 tons of gravel an hour. Pit is 900' long, 400' wide, 100' deep.

## ... Slash your Handling costs with **SAUERMAN MACHINES**

Where materials are to be moved distances of several hundred feet or more, a Sauerman Drag Scraper or Cableway can cut the cost per cubic yard to a low figure because it is able to dig, haul and place the material in a continuous, straight-line operation, doing away with the expense of re-handling. The operation is smooth and rapid, producing large yardage with moderate expenditure of power.

The first cost of a Sauerman Machine is reasonable, maintenance amounts to very little, and the simplicity of operation makes it possible to place the control of even the largest installation in the hands of one operator.

Whether your project is large or small, there is a size and type of Sauerman machine suited to your requirements — a machine that will give you years of steady service at minimum expense.

★ Write us about your interests and we will send illustrated catalogs by return mail.

**Rope Haulage  
Equipment  
Specialists  
Since 1909**

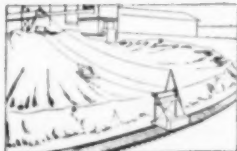
**SAUERMAN BROS., Inc.**

530 S. Clinton St.

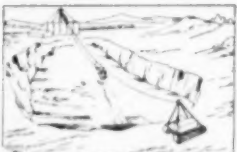
Chicago 7, Illinois



Sauerman Scraper Excavator



Sauerman Scraper Stockpiler



Sauerman Slackline Cableway

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Farrel-Bacon provides a complete engineering service, including design of plant and supplying all equipment from primary crusher to bin gate. Jaw-type crushers are available in sizes from 60" x 48" to 10' x 7'. Write for complete information.

**FARREL-BACON**  
ANSONIA, CONNECTICUT

BA 5

alter or amend in any way the provisions of this agreement.

"This instrument shall constitute the entire agreement between the company and the union duly authorized to represent the employees in the appropriate unit, as a result of collective bargaining negotiation; except such amendments or additions hereto as may be reduced to writing and signed by both parties."

### **Arbitrator's Opinion**

Following is the opinion of the arbitrator in his own words: "A careful study of the record in this case, including the contract as a whole, makes it impossible for me to sustain the union's position on this issue. Nowhere does the agreement of the parties expressly provide for a guaranteed work week. While, to be sure, the agreement is said to contain such an implied condition, neither the evidence of its bargaining history nor its language tends to support such a conclusion. Looking, rather, to the language employed, the bargaining history, and the circumstances surrounding the making of the contract, I am persuaded that while the provision prescribing a regular work week of 42 hr. per week, averaged over periods of four weeks, was indeed held out by management as something that other segments of labor would prize highly if they could obtain it, there was surely no intent to guarantee its employees 42 hours' work a week (average over four-week periods) under any and all circumstances.

"In construing an ambiguous contract provision, arbitrators, like courts, are entitled to place themselves in the same position as the contracting parties so as to view the circumstances as they viewed them and so as to judge the meaning of their language and of its proper application. As already stated, there is no evidence that the parties bargained directly and knowingly upon the matter of a guaranteed work week; it is inconceivable that an absolute commitment would have been made by the company to guarantee its employees not less than 42 hours' work a week (or 168 hours' work every four weeks) without bargaining for exemptions or escape provision in event of uncontrollable circumstances making it impossible for the company to provide the required amount of work. What appears convincingly is that the parties intended no more than that the company shall schedule regular work weeks which shall average not less than 42 hr. per week over four-week periods under normal operating circumstances but that it shall not be committed as guaranteeing 42 hours' work each and every week nor 168 hr. in every four-week period under any and all circumstances.

"The foregoing conclusion, then, makes it necessary to decide whether, under the facts and circumstances of this case, normal operating conditions

prevailed on April 5 and 6, 1951, which obliged the company to provide the employees with work. The truly simple answer to this is that the company did in fact offer the aggrieved employees an opportunity to work those days, but the offer was not accepted. What seems to have been overlooked in this entire controversy is that despite the company's action in shutting down the kiln on Thursday afternoon it nevertheless offered work to its employees and, had any of the aggrieved employees accepted such work, there would have been no cause to file the instant grievance. The union surely has no right to impose a liability upon the company merely because it reached the conclusion that the company's operations were closed down when the undisputed facts are that the company declared otherwise and the doors remained open to the aggrieved employees who could still have come to work had they wished to cross the Seafarers' picket line. The obvious conclusion is that either the aggrieved could not or would not cross the picket line to go to work and that this fact, rather than the company's action in shutting down the kilns, was responsible for their not working. Under these circumstances, to impose liability on the company for the aggrieveds' loss of time on the days in question would be highly inequitable.

#### Award

"Under the facts and circumstances of this case there was no violation by the company of the parties' contract and hence it has no liability for pay claimed by the instant grievance."

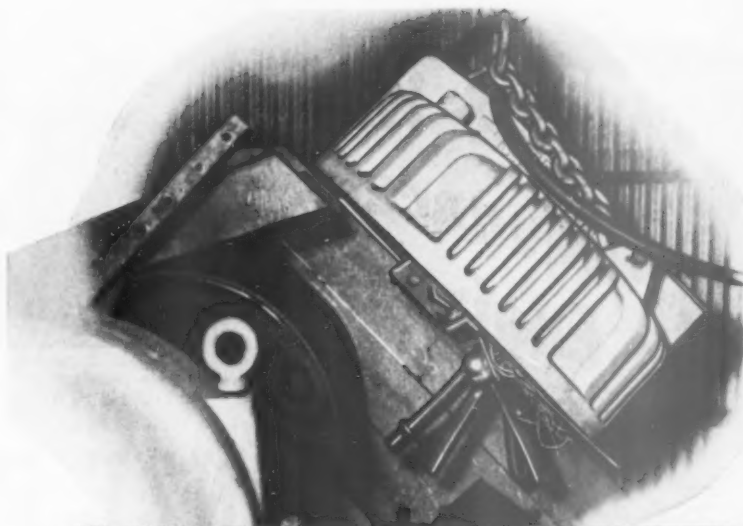
#### South African Lime

(Continued from page 89)

To be ready for any breakdown or emergencies, only four of the units operate at a time, and one is always kept as a stand-by. Together, the four carry 20 loads of 16 tons each, every hr., and approximately 5040 loads are hauled every month. A typical round trip from quarry face to crushers, a distance of from 600-1000 yd., takes 8 min. 10 sec., with 4 min. 30 sec. required for loading at the shovel.

Total output of the company's plants has more than trebled since the addition of the trucks, officials point out. In addition, average cost of delivering each ton of crushed stone to the plants has been reduced proportionately to about \$0.18 per ton. Operating costs of the vehicles are low, with each consuming only about \$50 worth of fuel in a 252-hr. working month over a distance of 1500 miles.

More than 90,000 tons of rock are shot down each month at the Union Lime Co. quarry with approximately 18,000 bags of cement and as many tons of lime and various other products being produced each day. Working at the present rate, it is estimated that there is enough lime in the vicinity for another 20 years.



**REMOVE TRAMP IRON**  
*Before DAMAGE Starts!*

Here is the positive, economical way to protect crushers, grinders, pulverizers and other vital equipment — use a STEARNS Suspended Magnet over your conveyor or head pulley.



#### CIRCULAR SUSPENDED MAGNETS

*Stearns* Suspended Separation Magnets are powerful units for removing tramp iron from various kinds of conveyed materials where protection to crushers and other processing machinery is necessary. Eliminating foreign metal means fewer repair bills on crushing equipment, fewer shutdowns and higher production.

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*Stearns* Suspended Separation Magnets are available in both circular and rectangular construction in all sizes to meet your needs. Easy to install and having low operating and maintenance costs, STEARNS Suspended Magnets are your best insurance against the tramp iron nuisance.

Whether your problem is the fairly simple job of tramp iron removal or the concentration and beneficiation of complex ores, STEARNS has EXPERIENCE ENGINEERED equipment to meet your requirements. Tell us about your problem; complete recommendations without obligation.



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**Stearns** **MAGNETIC INC.**

675 South 28th Street, Milwaukee 46, Wisconsin

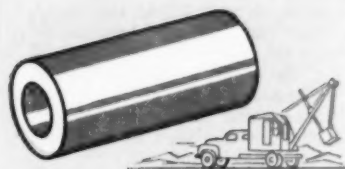
**"QUICK-WAY"**  
Reg. U. S. Pat. Off.  
**Advanced  
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### **Greater Strength and Reliability**

1. "QUICK-WAY" Bronze Bushings withstand heavier loads than other types of bearings—at the speeds used.
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3. "QUICK-WAY" Bronze Bushings eliminate sudden and complete breakdowns.
4. "QUICK-WAY" Bronze Bushings wear and wear. They have reserves of metal for wear.



**"QUICK-WAY" Bronze Bushings  
Withstand Greater Loads**  
At the speeds used in shovel operation, large size Bronze Bushings support greater loads. The load is evenly distributed over the entire bearing surface.

### **Easier, Lower Cost Maintenance**

1. "QUICK-WAY" Bronze Bushings are easy to adjust.
2. "QUICK-WAY" Bronze Bushings are easy to replace. Minimum of dismantling. Less lost time.
3. "QUICK-WAY" Bronze Bushings cost little to replace when compared to other types of bearings.
4. "QUICK-WAY" Bronze Bushings are grooved for proper lubrication.
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**"QUICK-WAY" Bronze Bushings  
Give Longer Service**  
Bronze Bushings wear and wear. An adequate supply of reserve metal is available for continued wear.



**"QUICK-WAY" Bronze Bushings  
Give Dependable Service**  
No fear of sudden breakdown with Bronze Bushings. A Better Truck Mounted Shovel—A Better Bushing.

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Denver, Colorado • U.S.A.

Please send me complete details on "QUICK-WAY" truck shovels—four different models for large jobs and small.

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City \_\_\_\_\_ State \_\_\_\_\_

*The Pioneer in Truck Mounted Shovels*

**4 Models—From 3 to 10 Ton Crane Capacity.**





Participants in the M.H.I. Pittsburgh conference were, l. to r., center table: L. West Shea, president, M.H.I.; A. K. Strong, American Cyanamid Co.; L. G. Weller, Fuller Co.; Carleton Lord, U.S. Steel Co.; S. M. Mercier, Jeffrey Manufacturing Co.; C. D. Gabor, Harbison-Walker Refractories; Fred Sheriff, Clark Equipment Co.; E. Lee Heidenreich, Jr., consulting engineer; O. W. Werner, Link-Belt Co.; (standing) E. R. Lutz, Atlas Powder Co.; H. H. Hall, Aluminum Co. of America; F. J. Schmidt, American Steel Dredge Co., Inc.; A. B. Crichton, Jr., Johnstown Coal & Coke Co.; E. W. Franz, May-Fran Engineering Co.; A. D. Sinden, Stephens-Adamson Manufacturing Co.; M. C. Dow, New York Trap Rock Corp.; R. F. Wikoff, The Thew Shovel Co.; B. R. Carter, M.H.I. staff

## Material Handling

THE MATERIAL HANDLING INSTITUTE held the first of a series of user-manufacturer conferences, sponsored by the institute's Industry Service Committee, at Pittsburgh, Penn., February 28-29.

The conference series was designed with the objective of developing better industrial efficiency through improved material handling methods, by bringing together equipment manufacturers and users in a workshop type clinic.

The Pittsburgh meeting, devoted only to current problems in dry bulk handling, was restricted to 16 delegates—one from each of eight equipment manufacturers having much bulk-handling experience, and one each from the mineral mining, quarrying, processing, chemical, ceramic, coal mining, grain and metal producing industries. Each user posed a major and specific problem, characteristic of his industry. The engineering representative of each manufacturer offered his suggestions and solutions in the terms of his own experience.

The crushed stone industry, represented by a major rock quarry operator, questioned the point at which conveyors should replace truck transportation, skip hoists or other methods of hauling for the most economical removal of rock from the quarry face. While not completely answered, a solution was indicated in terms of output tonnage, life of each quarry level and the amortization period.

The next in the series of M.H.I. user-manufacturer conferences has been scheduled for the later part of May, in either Detroit or Chicago, and will feature the subject "Better Methods of Handling Scrap."

## Premix for Road Repairs

FRED C. FOY, vice-president and general manager of the Tar Products Division of Koppers Co., Inc., Pittsburgh, Penn., recently announced that special binders for a new type of road material, known as "Komac," were produced in limited quantities last fall

and winter in Koppers Co.'s plants at Chicago, Ill., and Utica, N.Y., with additional facilities possible in time for the 1952 season.

The new road material is made by mixing special bituminous binders with aggregates to form a premix which when pressed into chuck-holes of streets or roads is said to make a long-lasting patch. According to the company, this premix may be applied in any kind of weather, can be stockpiled in readily usable form throughout the winter and laid down without heating, using standard road-repair equipment. Other advantages claimed for the product are: it does not adhere to hauling or spreading equipment; it need only be tamped or rolled into the holes in pavement; it does not "bleed" or push out of position in hot weather; it can carry traffic immediately after it is rolled; and it shows great resistance to skidding.

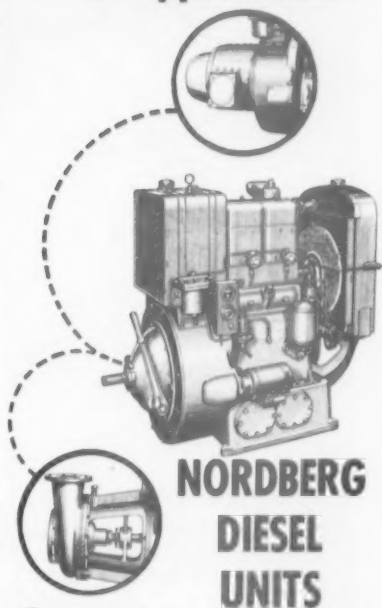
Koppers Co. stated that it will particularly recommend the new Komac premix for road patching, but predicted that, in the future, complete roads will be constructed and surfaced with this material.

## Canadian Clays and Shales

THE MINES BRANCH of the Canadian Department of Mines and Technical Surveys, in 1949, began an investigation into Canadian sources of clay and shale raw materials suitable for the production of lightweight aggregates. A report has now been published which contains the results of test work on samples from what are considered the most important known deposits within a marketable distance of well populated areas.

The 69-page book, "Preliminary Report on Coated Lightweight Concrete Aggregate from Canadian Clays and Shales," includes the following subjects: test methods; relation of chemical properties to the bloating of clays and shales; application of chemical analyses to the problem of producing coated aggregate; and locations, descriptions and test results. A map, illustrations and a bibliography are also included.

## Versatile—Low Cost Power for Hundreds of Applications



IN HUNDREDS of applications in many industries . . . for power units on shovels, for crane magnets, for pumps in mines, quarries, and irrigation, for petroleum production pumping, for auxiliary generating sets, ashore and afloat, for standby lighting units in manufacturing plants . . . that's where you'll find NORDBERG "4FS" Diesel Engines on the job, producing dependable power at low operating and maintenance costs.

Built in 1, 2, and 3-cylinder sizes from 10 to 45 hp, these heavy duty medium speed units are available as straight power units with stub shaft or clutch power take off—as packaged generator sets producing from 6 to 30 K.W.—and as "packaged" centrifugal pumping units.

Send the coupon today for more details.

**NORDBERG**  
BUILDERS OF AMERICA'S LARGEST  
LINE OF HEAVY DUTY DIESELS

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Please send literature describing the full line of Nordberg "4FS" Diesel Power Units.

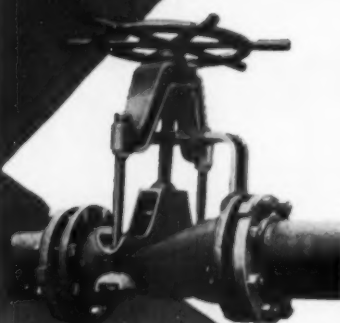
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## Massco-Grigsby RUBBER PINCH VALVES Resist Abrasive Pulps



Severe abrasion quickly destroys metal valves while these rubber pinch valves show little wear. They shut tight, even on solid particles. There are no packing glands, and freezing does not damage the patented hinged design sleeve. Sizes 1" to 12" available for continuous pressures up to 100-150 psi.

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## FINANCIAL

### RECENT DIVIDENDS

Basic Refractories, Inc.—Q...	\$.25	Mar. 31
Basic Refractories, Inc.—pf.—In	1.10	Apr. 1
Calaveras Cement Co.	.25	Mar. 15
California Portland Cement Co.	.40	Apr. 25
California Portland Cement Co.—sp.	.60	Apr. 25
Coronet Phosphate Co.	2.00	Mar. 31
General Portland Cement Co.	.50	Mar. 31
Ideal Cement Co.—Q	.50	Mar. 31
Kelley Island Lime & Transport Co.—Q	.35	Mar. 29
Keystone Portland Cement Co.	.75	Mar. 12
Medusa Portland Cement Co.	.60	Apr. 10
Pacific Coast Aggregates, Inc.—Q—pf	1.12½	Apr. 15
Pennsylvania Glass Sand Corp.—Q	.30	Apr. 1
Pennsylvania Glass Sand Corp.—Q—5% pf.	1.25	Apr. 1
Standard Silica Corp.—Q	.12½	May 15
Superior Portland Cement, Inc.	.25	Mar. 10
Warner Co.—Q	.40	Apr. 15

**PETOSKEY PORTLAND CEMENT CO.**, Petoskey, Mich., has reported a net income of \$224,602, or \$0.90 per share on 250,000 shares, for the year ended December 31, 1951. This compares with a net income of \$211,990, or \$0.85 per share for the preceding year. Net sales for 1951 amounted to \$4,134,389, as against \$3,657,855 for 1950.

**WEST ALLIS LIME & CEMENT CO.**, Milwaukee, Wis., increased its capital stock from 20,000 shares to 30,000 shares, par value \$10.

**CONSOLIDATED CEMENT CORP.**, Chicago, Ill., for the year ending December 31, 1951, lists a net income of \$452,700, or \$4.53 per class A share, on 99,916 shares, compared with a net income of \$538,630, or \$5.39 per class A share, for the previous year. Net sales for 1951 totaled \$4,972,700, as against \$4,611,300, for 1950.

**NORTH MILWAUKEE LIME & CEMENT CO.**, Milwaukee, Wis., has increased its stock from 2500 shares to 4000 shares, par value \$100.

**PASADENA SAND AND GRAVEL CO., INC.**, Pasadena, Texas, has increased its capital stock to \$100,000.

**TOWS LIME & CEMENT CO.**, Milwaukee, Wis., increased its capital stock from 3500 shares to 7000 shares, par value \$100.

**BASIC REFRACTORIES, INC.**, Cleveland, Ohio, at a special stockholders' meeting, approved the issuance of 10,000 shares of 5% percent cumulative preferred stock, par value \$100, and an increase in authorized common stock to 650,000 shares from 500,000.

**FOND DU LAC STONE CO., INC.**, Fond du Lac, Wis.; has increased its capital stock from 100 shares, par value \$100, to 1000 shares, par value \$100.

**LONGHORN PORTLAND CEMENT CO.**, San Antonio, Texas, has reported a net income of \$990,582, or \$1.99 per common share on 499,160 shares for the year ending December 31, 1951, which compares with a net income of \$1,245,982, or \$2.50 per share for the preceding year.

## MANUFACTURERS NEWS

Hardinge Co., Inc., York, Penn., announces that the G. R. Locker Co., Montreal, Canada, has been appointed representatives for eastern Canada.

Pioneer Engineering Works, Inc., Minneapolis, Minn., announces that O. J. Ellertson, vice-president, has been placed in charge of all manufacturing and procurement operations. Export sales duties formerly handled by Mr. Ellertson will be handled by the domestic sales department under K. E. Brunsdale, first vice-president, and Carl R.



O. J. Ellertson

Rolf, vice-president and sales manager. Earl A. Lerner, formerly in charge of sales and engineering in southern California for American Manganese Steel Co., has been appointed Western mines representative in the southwestern states.

The Green Fuel Economizer Co., Inc., Beacon, N.Y., has added the Aerodyne dust collectors to its line of products by acquiring U.S. patent rights from the Aerodyne Atlantic Corp., New York, N.Y. Developed in Sweden before the war, Aerodyne dust collectors were introduced in the United States in 1949. The various kinds of dust being collected in the Aerodyne include cement and rock dust from kilns and crushers, fly ash and soot generated by boiler plants.

Standard Steel Corp., Los Angeles, Calif., announces the promotion of C. N. Rees to vice-president in charge of manufacturing, in addition to his duties as sales manager. K. G. Thies has been elected to the board of directors and appointed secretary. Robert J. Johnson, purchasing agent, has also been elected to the board of directors and appointed treasurer.

Drill Bit & Tool Co., Midland, Penn., announces that Edward L. Fish and Robert B. Crawford have been named national sales representatives, with headquarters at the Midland plant.

Gould-National Batteries, Inc., Industrial Div., Trenton, N.J., has announced the appointment of F. A. Miller, former New York regional sales manager, as coordinator of sales at Trenton, N.J., and Frank Keenan as manager of headquarters sales. O. W. Rider, former Cleveland district manager, has been named regional manager at Pittsburgh, and John P. Kelly, Philadelphia representative, has been appointed manager of the Detroit regional office. Malcolm Janis has been made regional manager in the New York office, and Stanley J. Mahurin, Denver area representative, has been named San Francisco district manager.

# RESEARCH for better grinding

We're alert to every Angle



Our engineers are always looking for new "angles" that will add to the durability of CF&I forged steel grinding balls—keep them round. CF&I engineers like to visit the plants where our products are used to check performance and to develop new ideas.

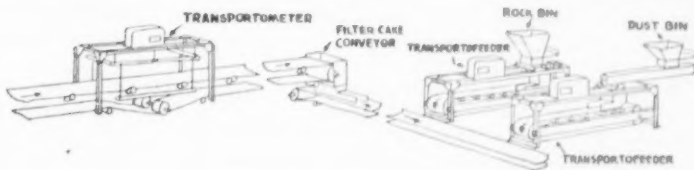
It is this attention to possible improvement which is back of the continued high quality of CF&I grinding balls. For the past 18 years these balls have maintained a reputation for homogeneity, hardness, toughness, and wearability.

CF&I engineers are at your service on any grinding media problems. Let's talk it over.

THE CALIFORNIA WIRE CLOTH CORPORATION, OAKLAND  
THE COLORADO FUEL & IRON CORPORATION, DENVER  
WICKWIRE SPENCER STEEL DIVISION, NEW YORK

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CONTINUOUS PROPORTIONING  
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introducing the...

"One Armed Bandit"  
that pays off...



## MODEL H SCOOPMOBILE FULL HYDRAULIC FRONT END LOADER

**Shovel, Load and Transport  
All Types of Bulk Material**



The Model H SCOOPMOBILE with full hydraulic steering lift and bucket control is an outstanding material handler. Built for hard work, it gives top performance under all conditions. Planetary drive with 3-to-1 reduction ratio gives dependable power for all operations. Conveniently located finger-tip controls give the operator in cab full-vision command of every movement. Vickers hydraulic power steering gives positive control and lessens operator fatigue.

The versatile Model H SCOOPMOBILE with  $\frac{3}{4}$  cu. yd. scoop has rated lifting capacity of 4,000 pounds and standard dumping height of 8 feet. Quick-change attachments include swivel-type concrete hopper, lift forks, special fertilizer or hay fork, and crane boom...and make the Model H SCOOPMOBILE an efficient multi-purpose unit.

**EXTRA-LOW IN INITIAL COST...EXTRA-HIGH IN EFFICIENCY**

Write for literature and name of your nearest Mixermobile dealer.

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STATIONARY MIXERS • DUO-WAY SCOOP • TELESCOPIC LIFT • STATIONARY TOWER

**Box 7527 • Portland 20, Oregon**

W. A. Jones Foundry & Machine Co., Chicago, Ill., announces that Thomas A. Jones, vice-president, has been elected president of the company. Frederick H. Hoge has been named chairman of the board; Robert B. Moir, vice-president in charge of engineering; Joseph A. Marland, vice-president and manager of sales and service; James B. Christerson, vice-president and treasurer; and Robert E. White-way, secretary and production manager. Mr. Jones, who joined the firm upon his graduation from Yale in 1940, has also served as personnel manager, secretary, assistant sales manager and vice-president. He is a grandson of W. A. Jones who founded the company in 1890.



Thomas A. Jones

Kraft Bag Corp., New York, N.Y., announces that James W. Taylor has been placed in charge of bag sales, with headquarters in New York. He was formerly assistant district manager for the St. Regis Paper Co. B. T. Miller, who formerly covered the middlewestern territory, will now cover Alabama, Mississippi, Louisiana, southwestern Tennessee, Arkansas and Texas.

Marion Power Shovel Co., Marion, Ohio, announces that John P. Courtright, executive vice-president, has been elected president and general manager of the company. He succeeds Harvey T. Gracely who has assumed an inactive status due to illness. J. Malcolm Strelitz, Marion attorney and industrialist, has been elected chairman of the



John P. Courtright

board. Adrien F. Busick, Jr., has been named vice-president in charge of engineering; Maurice V. Cornell, vice-president in charge of sales; and David E. Rizer, assistant to the president in sales and service. Officers re-elected are Alex Gibson, vice-president and treasurer; Merle Virden, secretary and assistant treasurer; Walter C. Kraft, assistant secretary; and Newton B. Schott, assistant secretary.

Mr. Courtright has been serving as executive vice-president since last June, and in recent months as chief executive officer during Mr. Gracely's absence. He joined the company in 1927 in the Chicago sales office, later becoming Chicago district sales manager. He moved to Marion as sales manager in 1937. Six years later, he was appointed vice-president in charge of sales, and became a member of the board in 1944.



Chase Bag Co., Chicago, Ill., announces that R. G. Bullock has returned to the company as manager of the Cleveland, Ohio, office, after serving a year with the Containers and Packaging Division of the National Production Authority.

Republic Rubber Div., Lee Rubber & Tire Corp., Youngstown, Ohio, has appointed John Bouchard & Sons Co., Nashville, Tenn., as distributor of the division's industrial rubber products.

Consolidated Products Co., Inc., New York, N.Y., announces that William A. Schnell, sales engineer for 40 years with Link-Belt Co., has joined its sales staff.

Clark Equipment Co., Industrial Truck Div., Battle Creek, Mich., has appointed Vernon L. Johnson as regional sales manager for the Northeastern region, which includes New York, Albany, Boston, Jersey City, New Haven, Philadelphia, Wilmington, Del., Harrisburg, Penn., and Portland, Maine. Mr. Johnson, who was formerly with Studebaker Corp., South Bend, Ind., will make his headquarters in New York City.

The Lincoln Electric Co., Cleveland, Ohio, announces the election of J. S. Roscoe, director of purchasing, and G. E. Tenney, service manager, as members of the board of directors.

Austin-Western Co., Aurora, Ill., has announced the appointment of Robert H. Diller as assistant advertising and sales promotion manager.

Link-Belt Co., Chicago, Ill., announces the election of Robert C. Becherer, executive vice-president, and William J. Kelly, president of the Machinery and Allied Products Institute, as directors of the company.

W. A. Riddell Corp., Bucyrus, Ohio, has named the Vern Wheeler Equipment Co., Inc., Jacksonville, Fla., as sales representative for the Warco line of motor graders in southern Georgia and Northern Florida.

Nordberg Mfg. Co., Milwaukee, Wis., has appointed Overvold Distributing Inc., Moorhead, Minn., as sales representative for the 4FS diesel engines in North and South Dakota, northwestern Minnesota, northern Nebraska and the eastern counties of Montana and Wyoming.

Schild Bantam Co., Waverly, Iowa, has announced the appointment of M. E. Wheeler as district sales manager for Iowa, Minnesota, North and South Dakota, Nebraska and a part of Missouri and Kansas. Mr. Wheeler, formerly district representative for Schramm, Inc., will make his headquarters in Kansas City, Mo.

Rust-Oleum Corp., Evanston, Ill., has appointed the following distributors: The Republic Supply Co. of California, Los Angeles, Calif.; Buhl Sons, Detroit, Mich.; The Adkins Co., Berlin, Md.; Mill & Contractors Supply Co., Wilmington, N.C.; The Warren Hardware Co., Warren, Ohio; American Radiator & Standard Supply Corp., Zanesville, Ohio; and Couch & Heyle, Peoria, Ill.

## For long wear and high production use **YUBA** SCREENS and CONVEYORS



**YUBA** makes Abrasion Resisting Steel Screens, flat or revolving, for all screening purposes—separating, scrubbing, sizing. Holes are taper drilled to prevent clogging, can be small and closely spaced for screening sands bearing monazite and other rare earths. All thicknesses from 1/4" up; other dimensions as big as your needs—screen shown is 50' long, 9' diameter, weighs about 65 tons. Competitive prices—ask for quotations.

**YUBA-built** conveyor pictured can handle 1440 tons per hour, is part of nearly mile-long conveyor system carrying crushed rock (minus 8") from pit to plant to stockpile. Yuba has built hundreds of heavy-duty conveyors for rock, gravel and sand since 1909. Put this experience to work on your conveying problems NOW.

### SCREENS, CONVEYORS, DREDGES,

built-to-order machinery—Yuba will gladly furnish estimates. Wire, write or call—no obligation, of course.



### YUBA MANUFACTURING CO.

Room 717, 351 California St., San Francisco 4, California, U. S. A.  
AGENTS: SIME, DARRY & CO., LTD., SINGAPORE, KUALA LUMPUR, PENANG.  
SHAW DARRY & CO., LTD., 14 & 19 LEADENHALL ST., LONDON, E. C. 3.  
CABLES: YUBAMAN, SAN FRANCISCO • SHAWDARCO, LONDON



*A thousand  
and one*  
**WIRE ROPES**  
**PREformed  
and internally  
lubricated**

THE EXPERIENCE OF hundreds of users—like yourself—goes into the making of Macwhyte Wire Rope. Their needs and yours have been studied by our engineers to produce the best wire rope for every type of quarry equipment.

Ask for G-15 Catalog

**MACWHYTE COMPANY**

2949 Fourteenth Ave., Kenosha, Wis. Manufacturers of Internally Lubricated PREformed Wire Rope, Braided Wire Rope Slings, Aircraft Cables and Assemblies, Monel Metal and Stainless Steel Wire Rope. Catalog available on request.

Mill depots: New York • Pittsburgh • Chicago • Minneapolis • Fort Worth • Portland • Seattle • San Francisco • Los Angeles. Distributors throughout U.S.A.

You get the correct wire rope for your equipment when you buy Macwhyte

1019



**YOUR MANGANAL  
DISTRIBUTOR IS ...**

**A Dependable Source**

**for all Manganal Products**

Look to him for advice to save you  
time and money on the repair and  
rebuilding of heavy equipment.



**MANGANAL**

U. S. Patents 1,876,738 - 1,947,167 - 2,021,945

**11% -13½% Manganese-Nickel Steel**

- Applicator Bars
- Wedge Bars
- Special Shape Applicator Bars
- Hot Rolled Plates
- Special Tite-Kote & Bare Welding Electrodes
- and
- Hard-Surfacing Welding Electrodes

Write TODAY for  
**FREE**

Literature on the  
latest methods for  
Speedy and Eco-  
nomical Repair of  
Worn Equipment.

Name of Nearest  
Distributor Upon  
Request.

Send for catalog  
and price list.

**STULZ-SICKLES CO.** **SOLE PRODUCERS**  
92 N. J. Railroad Ave.  
Newark 5, New Jersey

Caterpillar Tractor Co., Peoria, Ill., announces that T. R. Farley, vice-president, has been appointed to direct the expansion program at the York, Penn., plant. He was general manager of the earthmoving equipment plant at Joliet, Ill., and will be succeeded in this position by William L. Naumann, formerly assistant general factory manager at Peoria, Ill.

Allis-Chalmers Manufacturing Co., Milwaukee, Wis., announces that Frank Mussell, Eastern territory manager for the tractor division, has been appointed director of the Agricultural Machine and Implement Division of the Industrial and Agricultural Equipment Bureau of the National Production Authority, Washington, D.C.

Yale and Towne Mfg. Co., Philadelphia, Penn., announces that James H. W. Conklin has been appointed general sales manager of the Philadelphia division. He succeeds James P. Kinney who has taken over the distributorship in Los Angeles and southern California.

Joseph T. Ryerson and Son, Inc., Chicago, Ill., has acquired the stocks and warehouse facilities of the Seattle Steel Co., Seattle, Wash., and the Inland Empire Steel Co., Seattle and Spokane, Wash.

The Timken Roller Bearing Co., Canton, Ohio, announces the appointment of R. G. Wingerter as assistant general manager, and J. R. Splitstone as district manager of the automotive sales division. Announcement has also been made that George O. Wherley, general credit manager, has been named president of the Motor and Equipment Manufacturers Association.

Harbison-Walker Refractories Co., Pittsburgh, Penn., has announced the appointment of J. C. Willey as assistant to the president. Mr. Willey is the son of former president Raymond Willey, and has served in various operating and executive positions since 1934. He has been assistant to the vice-president since 1947. H. G. Hart, formerly of the Portsmouth, Ohio, sales district, has been transferred to the new specialties and retail department in Pittsburgh; Floyd A. Pearce, formerly of the Pittsburgh sales district, has been transferred to Portsmouth to replace Mr. Hart; and E. A. Olson succeeds Mr. Pearce in the Pittsburgh sales district.

Hammond Bag and Paper Co., Wellsburg, W. Va., announces the opening of its new multiwall paper bag plant at Pine Bluff, Ark. The former plant has been turned over for use by the Chemical Corps of the U.S. Army.

Cleaver-Brooks Co., Milwaukee, Wis., has announced the appointment of Harold F. Holtz as sales manager of the boiler division. He succeeds R. J. Tutsch who has resigned to form a new manufacturing agency partnership with T. P. Dyke to handle Cleaver-Brooks equipment in the Milwaukee area and the nine southeastern counties in Wisconsin.

Denver Equipment Co., Denver, Colo., has transferred A. B. Chavez from Denver to El Paso, Texas, as manager of the office. However, he will continue the field work in the Texas, New Mexico and northern Mexico area started by R. E. Lintner, who has returned to Denver on special work in sales engineering.

The Thew Shovel Co., Lorain, Ohio, announces that C. B. Smythe, president of the company, was elected president of the Power Crane and Shovel Association at its annual meeting in Washington, D.C.

Caterpillar Tractor Co., Peoria, Ill., announces that J. W. Mohler, assistant director of sales, has been appointed deputy director of the Construction Machinery Division of the National Production Authority.

Truck-Trailer Manufacturers Association, Inc., Washington, D.C., announces that William E. Grace, executive vice-president and general manager of Hobbs Mfg. Co., Fort Worth, Texas, was elected president of the association at its annual convention in Houston. He succeeds L. C. Allman of the Allman Co., Inc., Detroit, Mich.

John A. Roebling's Sons Co., Trenton, N.J., announces the appointment of L. Wayne Nelson as district sales representative for Virginia, West Virginia, Kentucky, Tennessee and North Carolina.

Barber-Greene Co., Aurora, Ill., has announced the appointment of Harold W. Newton as assistant sales manager of the conveyor division. Mr. Newton is a director of the Manufacturers Division of the National Crushed Stone Association. William C. Gifford has been named assistant sales manager of machine sales.

Allis-Chalmers Mfg. Co., Milwaukee, Wis., plans construction of a new factory branch for the tractor division in Independence, Mo., to serve agricultural and industrial dealers in eastern Kansas and western Missouri.

Hewitt-Robins, Inc., New York, N.Y., has moved its headquarters offices to Stamford, Conn. The Eastern division and export sales offices of Hewitt Rubber, Restfoam and Robins conveyors divisions will remain at 370 Lexington Ave., and offices of Robins engineers division will continue at 157 Chambers St., both in New York City.

R. G. LeTourneau, Inc., Peoria, Ill., has appointed Henry Cain as district sales representative for Nebraska, Kansas, Missouri and southern Illinois. David W. Flint has been named acting chief Washington representative, and Jack McCann has been appointed assistant Washington representative. William Barry has been transferred to the domestic sales department and Darrell Abernathy succeeds him as special representative for the government sales department. John Tuntas replaces Mr. Abernathy.

Straub Mfg. Co., Inc., Oakland, Calif., has appointed Universal Equipment Co., Vancouver, B.C., as representative for British Columbia, Alberta and the Yukon.

# MIR-O-COL

does a better  
job of  
hard facing  
—or your  
MONEY  
BACK!\*



\*Try a 10-lb. box on your job. If not 100% satisfied, return unused contents of box. Supplier will refund full price. This unusual offer is our way of showing you what we mean by MIR-O-COL high quality and superior performance. You'll see why MIR-O-COL is preferred by experts! (Offer good only in U.S.A.)

There's the right type of MIR-O-COL rod for every hard facing job.

Ask your supplier for  
**MIR-O-COL!**

**MIR-O-COL** ALLOY CO. Inc.

340 NORTH AVENUE 21, LOS ANGELES 31, CALIFORNIA



**THERE'S  
MORE THAN  
MEETS THE  
EYE  
IN**

## **HAMMOND Multi-Wall BAGS**



- ★ HIGHEST QUALITY PAPERS AND MATERIALS
- ★ MODERN MACHINES—SKILLED PERSONNEL
- ★ EFFICIENT PLANT OPERATIONS

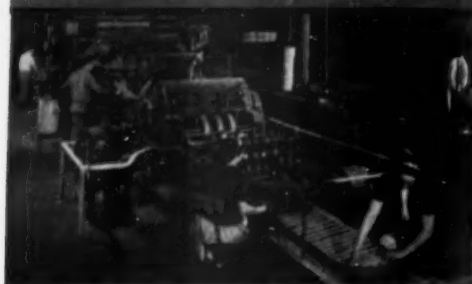


Photo shows "tubes" coming off large tuber, from which they are conveyed to sewing machines, where they are made into Sewn Type Multi-Walls.

Satisfied customers in the cement and rock products industries know that all multi-wall bags are not alike. The combined efforts of progressive management, conscientious and thoroughly trained personnel, and expert sales engineers who thoroughly understand the problems of shipping hundreds of products—are the primary reasons for the superiority of Hammond Multi-Wall Bags. *Write for booklet—"To Serve You Better with Hammond Multi-Wall Bags."*

### **HAMMOND BAG & PAPER COMPANY**

General Offices: Wellsburg, W. Va.

Plants in Wellsburg, W. Va. and Pine Bluff, Ark.

Representatives in the following cities:

Chicago, Ill.	Charlotte, N.C.	New York, N.Y.	Bluefield, Va.
Columbus, Ohio	Minneapolis, Minn.	Baltimore, Md.	Ligonier, Pa.
Houston, Texas	Kansas City, Mo.		

## **RESISTO-LOY will**

**double the service of your  
"CHEEK" PLATES**

Here is another typical example of how a few pounds of RESISTO-LOY, properly applied to a set of Cheek Plates before they are ever installed in the Crusher, can produce a nice net saving.

It is a perfectly safe estimate that a NEW Cheek Plate can be coated with RESISTO-LOY for less than half its cost — and that plate will operate **TWICE AS LONG** as one uncoated.

This purchasing of Cheek Plates is one of those so-called minor expense items each year, but a close check reveals that they run into real money.

Get a supply of RESISTO-LOY from our field man. He will show you the simple method of application and how to prevent any warpage in the cheek.

**RESISTO-LOY CO., Mfrs., Grand Rapids 7, Michigan**





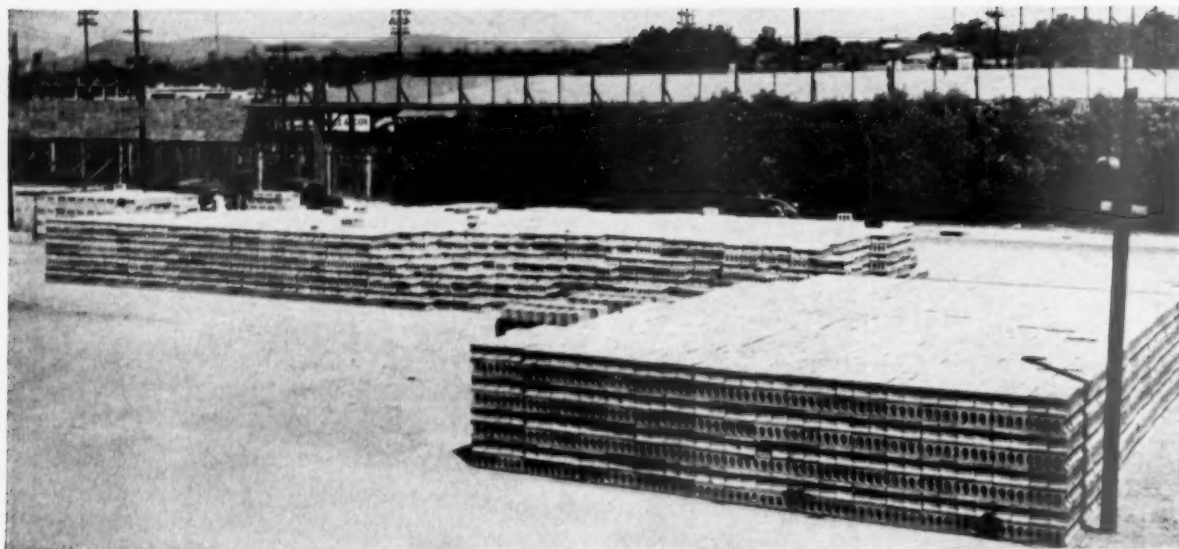
# CONCRETE PRODUCTS

A SECTION OF ROCK PRODUCTS

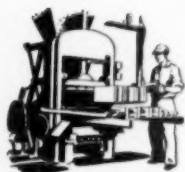
CONCRETE UNITS · READY-MIXED CONCRETE



Handling lightweight precast concrete beams in Sweden



### Makes superior concrete products



Plants using Duraplastic have found it reduces costs because there is less breakage in handling green products. There are fewer culls and throw-backs. With Duraplastic, edges and corners are cleaner and truer. Face texture is richer, especially when harsh aggregates are used.

And users report increased resistance to passage of water through finished products.

### Feeds easily through machine

A damper mix may be used with Duraplastic air-entraining portland cement. Manufacturers find that this damper mix is "rubbery" and more cohesive. It stays together better, feeds easily through machines. Duraplastic is the ideal cement for concrete block, brick, pipe, drain tile, silo staves and other machine-made products.

**OFFICES:** Albany, Birmingham, Boston, Chicago, Dayton, Kansas City, Minneapolis, New York, Philadelphia, Pittsburgh, St. Louis, Waco.

### YET DURAPLASTIC\* COSTS NO MORE

It sells at the same price as regular cement and requires no unusual changes in procedure. Complies with ASTM and Federal Specifications. For descriptive booklet, write Universal Atlas Cement Company (United States Steel Corporation Subsidiary), 100 Park Avenue, New York 17, N. Y.

\*"Duraplastic" is the registered trade mark of the air-entraining portland cement manufactured by Universal Atlas Cement Company.



**Makes Superior Concrete Products at No Extra Cost**

NBC SUMMER SYMPHONY CONCERTS—Sponsored by U. S. Steel Subsidiaries—Sunday Evenings—June to September

CP-G-1269R

# INDUSTRY NEWS



New officers of Texas Concrete Masonry Association: left to right, Charles T. Crowe, director; Arthur J. Clark, retiring president and chairman of the board; Lewis Lloyd, vice-president; Vernon Cole, president; and William Smith, secretary-treasurer. Also elected, but not in the picture, were directors Harry Franks and Robert Brown

## Elects New Officers

TEXAS CONCRETE MASONRY ASSOCIATION elected new officers at its annual convention held recently in Waco, Texas. Vernon Cole, president of Texas Concrete Works, Waco, was named president, succeeding Arthur J. Clark, vice-president of Texas Industries, Inc., Dallas, who in turn was named chairman of the board of directors.

Other officers elected were Lewis Lloyd, Alatec Construction Service, Houston and New Orleans, vice-president; William Smith, Black-Brolier Co., Houston, secretary-treasurer; Charles T. Crowe, Crowe-Gulde Co., Amarillo, director; Harry Franks, Atlas Building Products, El Paso, director; and Robert Brown, Texas Concrete Block Co., Lubbock, director.

Speakers at the convention were E. W. Dienhart, executive secretary of the National Concrete Masonry Association; Cedric Willson, vice-president and chief engineer, Texas Industries, Inc., Dallas; and D. D. Bryan, advertising manager, Besser Manufacturing Co., Alpena, Mich.

## Rubber Formwork Linings

THE NATURAL RUBBER BUREAU, in a recent issue of *Rubber Developments*, describes a possible method of obtaining a textured concrete surface without after-treatment, which involves lining the face of the formwork with some form of textured sheet.

Exposure of slabs cast against various forms of rubber matting have shown good weathering qualities. Some rubber sheets have an open "stipple" texture which permits excess water in the concrete to escape via the formwork. Sheets of this type act in a somewhat similar manner

to an absorbent form lining, producing a sandy, as opposed to a glazed, surface. The main problems yet to be solved are how best to attach the sheets to the formwork and the type of treatment of the joint between the sheets.

Copies of the article may be obtained without charge from the Natural Rubber Bureau, 1631 K St., N.W., Washington 6, D.C.

## Concrete Short Course

THE FIRST READY-MIXED concrete short course ever to be held in Ohio was held at the University of Akron, March 12-14. Herbert Rusk, president of Ohio Ready-Mixed Concrete Association and one of the sponsors of the school, conducted the sessions. Speakers at the three-day school included R. D. Landon, dean of the College of Engineering, University of Akron; Ray C. Reese, engineer, Toledo, Ohio; R. M. Cook, professor and head of the civil engineering department, University of Akron; Fred Hubbard, director of research, National Slag Association; and Prof. D. E. Anderson, director of the testing laboratory, University of Akron.

## Promotional Booklet

NATIONAL CONCRETE MASONRY ASSOCIATION has announced the publication of a promotional booklet which emphasizes the use of concrete masonry in basement construction. During the past few years there has been a trend toward basementless homes. The booklet was designed to (1) resell the basement as valuable living area, and (2) promote the use of concrete masonry in basement construction.

MINNEOPA CONCRETE PRODUCTS CO., Mankato, Minn., was recently purchased by Elmer E. Apt and Garland F. Johnston, Fort Dodge, Iowa. The plant, which was constructed a little less than three years ago, has been producing approximately 1,500,000 concrete and pumice block annually. The plant also produces concrete steps and other allied concrete products.

DODDS AND FOUNTAIN CO., Longview, Texas, producer of Haydite block, recently completed an expansion program which tripled the capacity of the original plant built six years ago.

KENNETH H. DATEL, Terrytown, Neb., and John K. Banks, Scottsbluff, Neb., have purchased the Terry Carpenter concrete block, ready-mixed concrete, and sand and gravel business.

A LABORATORY-TYPE SINTERING MACHINE, a pilot plant model valued at \$6600, has been donated to Armour Research Foundation of Illinois Institute of Technology by Duncan Foundry and Machine Works, Alton, Ill. The machine will be used for studies of lightweight aggregates for concrete and the treatment of finely divided ores.

ANGLO SCOTTISH TOOL CO., LTD., Gateshead, England, is desirous of appointing U.S. distributors for the Adams-Powel roof tile-making plant. Thus far, only one agent, E. M. Wakeman & Associates, Lakeland, Fla., has been appointed, for the southeastern states.

GUY JELLISON AND JACK DEHEART, Garnett, Kan., recently purchased equipment for the production of concrete block. The block, which require no mortar, are fitted together in a tongue-and-groove pattern.

RINKER, INC., Fort Pierce, Fla., is building a \$250,000 concrete block manufacturing plant which will have a capacity of 4500-6000 block per day. Installation of a rail siding will be the first phase of the new plant construction. The plant will also include warehouses and an office building.

HUNT LIMESTONE CO., Osceola, Mo., has been appointed local distributor of ready-mixed concrete for Stewart-Nattinger, Inc., of Clinton. The company is also handling concrete block and other building materials.

PORTAGE BLOCK CO., Port Clinton, Ohio, has been sold to Edward Sztuk, who has changed the firm name to Portage Concrete Products. Former owner was Harold Jeremy.

CHARLES R. EATCHELL, Howard Collins and John Hayden have established a ready-mixed concrete plant at Lakewood, Colo., and will operate it under the firm name of Jefferson Transit Mix Co.

JAKE SHAW, Kansas City, Mo., recently announced plans to build a ready-mixed concrete plant in Kansas City, near the Kansas City Southern railroad depot.

# GRAVITY DUMP eliminates



## SIMPLE BODY-RELEASE LEVER WORKS INSTANTANEOUSLY

**1** Body release lever is located at steering wheel, no reaching or stretching. Lever engages trip rod on Dumptor body . . .



**2** Trip rod instantly releases latch hooks from body latch seat on the Dumptor chassis frame. Gravity dumps the load . . .



**3** Body rolls on heavy-duty rockers. Snub chains attached to big coil-spring shock-absorbers check body at 70-degree tilt.





# body hoists

Koehring Dumpsters have no slow-working body hoists. You trip the release lever and gravity dumps the 6-yard load in one second.

**Cuts maintenance costs . . .** there are no complicated mechanical hoists to slow up haul cycles . . . no expensive hoist replacement parts, maintenance or down time to eat into your profits. And gravity dump is always instantaneous, trouble-free in all temperature extremes . . . never wears out.

**No spring maintenance** is another money-saving advantage you get with Koehring Dumpsters. There is just one big, double-coil chassis spring on steering axle . . . none on driving axle. Big shock-absorbing drive tires eliminate need for more springs . . . save spring maintenance time and replacement costs.

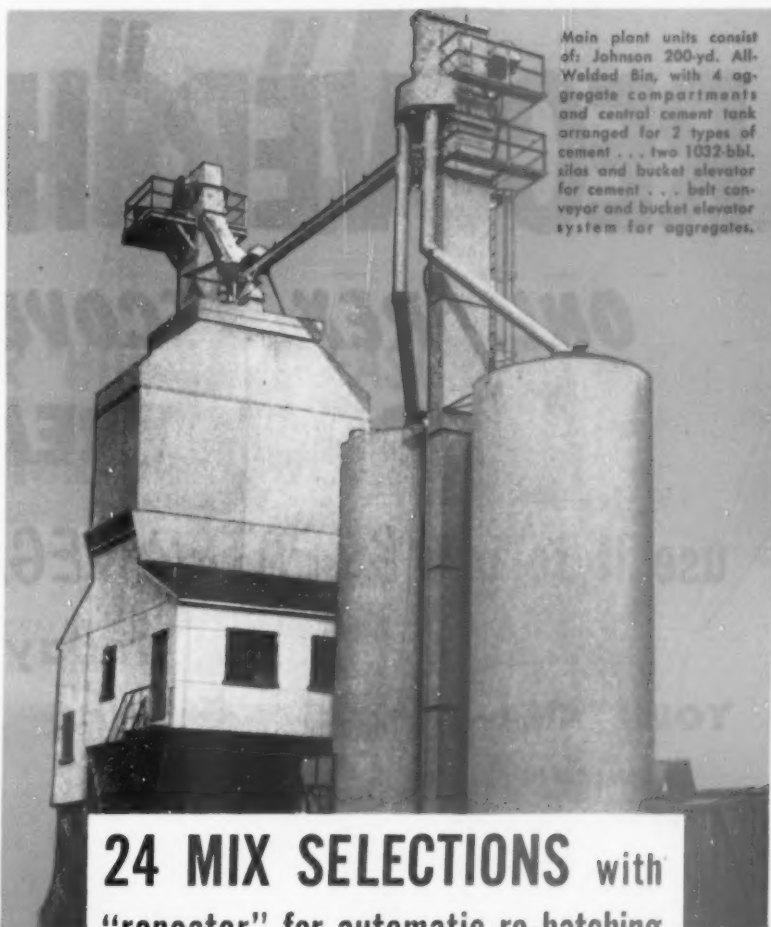
**Check your body hoist** and spring maintenance costs for a year . . . see how much you will save when you haul with heavy-duty Dumpsters. In addition, Koehring constant-mesh transmission gives Dumpster the same 3-speed travel forward and reverse for "no-turn" shuttle hauling . . . increases production and your profits.

Get complete facts and figures from your Koehring distributor . . . or write to us for informative 28-page Dumpster<sup>®</sup> catalog.

## KOEHRING CO.

Milwaukee 16, Wis. Subsidiaries:  
PARSONS • KWIK-MIX • JOHNSON

CK 224



Main plant units consist of: Johnson 200-yd. All-Welded Bin, with 4 aggregate compartments and central cement tank arranged for 2 types of cement . . . two 1032-bbl. silos and bucket elevator for cement . . . belt conveyor and bucket elevator system for aggregates.

## 24 MIX SELECTIONS with "repeater" for automatic re-batching

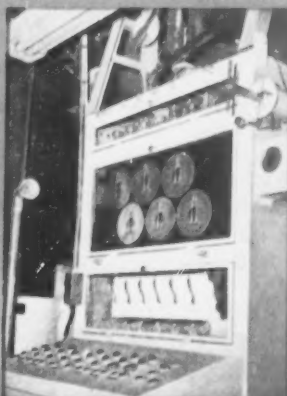
Fully automatic and completely flexible, this Johnson Transit-Mix Plant produces 24 different size and type batches of aggregates and cement for a commercial ready-mix company at Covington, Ky.

Dial on a 24-mix-selector panel (below) provides for 2500-lb., or 3000-lb.-per-sq.-in. concrete in 1/2, 3/4 and 1-yard batches. On each size batch there are 4 individual selections for 3, 4, 5 or 6-in. slumps. This makes it easy to change from one type of batch to another as needed. A "repeater" provides for continued automatic batching of any one selection for a pre-determined number of times. Operator sets the mix selector, sets the "repeater",

pushes the "start" button . . . and the plant weighs out batches fast, accurately.

Plant is equipped with a 2500-lb. sand batcher . . . three 2500-lb. batchers for fine, medium and coarse aggregates . . . a 2000-lb. water weigh batcher . . . and a 2000-lb. cement batcher with dual fill valves

for selecting 2 types of cement. All are fully automatic, and controlled by the Central Dial Scale Unit with pen recording of the weight of each single-material batch. Recorder shows "full" and "empty" weight of hopper, makes sure a complete batch is weighed out on each material. For all the facts see Johnson distributor . . . or write,



C. S. JOHNSON CO.

Koehring Subsidiary

CHAMPAIGN, ILLINOIS

# RECOVER "HIDDEN

**ONLY REX RECOVERS YOUR  
"HIDDEN TREASURE"**

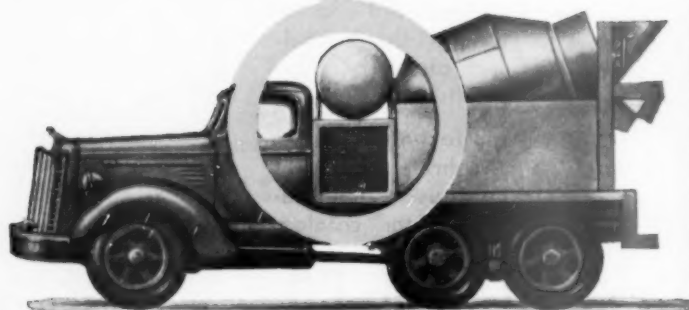
use it to get **GREATER LEGAL PAYLOADS**  
*today and tomorrow*

**YOUR "Hidden  
Treasure"...**

The space directly  
behind the truck  
cab...The most  
valuable legal  
payload space on  
your truck.



**"HIDDEN TREASURE" RECOVERY=BIGGER PAYLOADS**



**CONSTRUCTION**

®

# TREASURE"!

what's in YOUR "HIDDEN TREASURE"?

**maximum flexibility of choice**

Use of the "HIDDEN TREASURE" enables you to choose the truck you need!

Ability to use the "HIDDEN TREASURE" enables you to mount the Rex Machine on that truck for greatest legal payload!

**Best of all...**

Use the "Hidden Treasure" to insure yourself against premature obsolescence

**LOW GROSS VEHICLE WEIGHT TODAY?**

Use all the gross vehicle weight you have today. But, if that GVW is lower than in most states today, it will probably go up tomorrow . . . or next year . . . or 2 years . . . or 5 years! Then what about the machines you are buying today! Will they and your present equipment be obsolete? *Not when you buy the Rex machines which enable you to use the "Hidden Treasure"!*

**NO HAULING EQUIPMENT AVAILABLE TODAY TO TAKE ADVANTAGE OF YOUR GROSS VEHICLE WEIGHT?**

That could change tomorrow! Industry is working overtime to bring about this much needed improvement in transportation equipment. When you wake up tomorrow, will the machines you're buying today be obsolete? *Not if you're buying Rex machines which enable you to use the "Hidden Treasure."*

**Flexibility in mounting with the "Hidden Treasure" gives you the greatest legal payload on any given truck . . . trucks available today or on any future development.**

**SEE THE "HIDDEN TREASURE" AND SEE WHAT IT MEANS TO YOU.** Your Rex Distributor will be happy to demonstrate it for you. Chain Belt Company, 4649 W. Greenfield Ave., Milwaukee 1, Wis.

**MACHINERY**

# Another Leader<sup>\*</sup> IN THE PRODUCTS INDUSTRY PREFERS BESSER VIBRAPACS!

★ This is the 95th of a series of ads featuring leaders of the Concrete Products Industry who are stepping up block production with Besser Vibrapac machines.



B. D. Harter, President and N. D. Harter Vice President and Secretary in charge of production.



Harter laboratory with complete facilities for controlling production, testing of all raw materials and engaging in product research.



Modern high pressure steam curing system. Illustration shows battery of five autoclaves, each one weighing 54 tons and heavily insulated with fibre glass.

Aerial view of the extensive Oklahoma City plant with insert illustration showing two Besser Vibrapacs installed.

## Harter Marblecrete Stone Company Produces Quality Block on Besser Vibrapacs

Since 1946 this progressive Oklahoma City block manufacturer has used Besser Vibrapacs and has found them to be very versatile and dependable.

The flexibility of the Vibrapac, and the advantage of the original Besser principle of making all sizes and units on one set of Plain Pallets, permit Harter to supply block for the entire building. Soffit Block are furnished for fire-safe, economical, permanent floors and roofs.

The desire to furnish a quality product has been the incentive for Harter throughout the years. Now their latest advancement is the installation of high pressure steam curing.

Besser Manufacturing Company will be glad to discuss with you the installation of Vibrapacs in your existing plant or to assist you in designing a new one. Write today for complete information "How Besser Can Help You".

## BESSER MANUFACTURING COMPANY

Complete Equipment for Concrete Products Plants  
ALPENA, MICHIGAN, U. S. A.



# BESSER

BATCH  
MIXERS

SKIP  
LOADERS

BLOCK & BRICK  
CUBERS

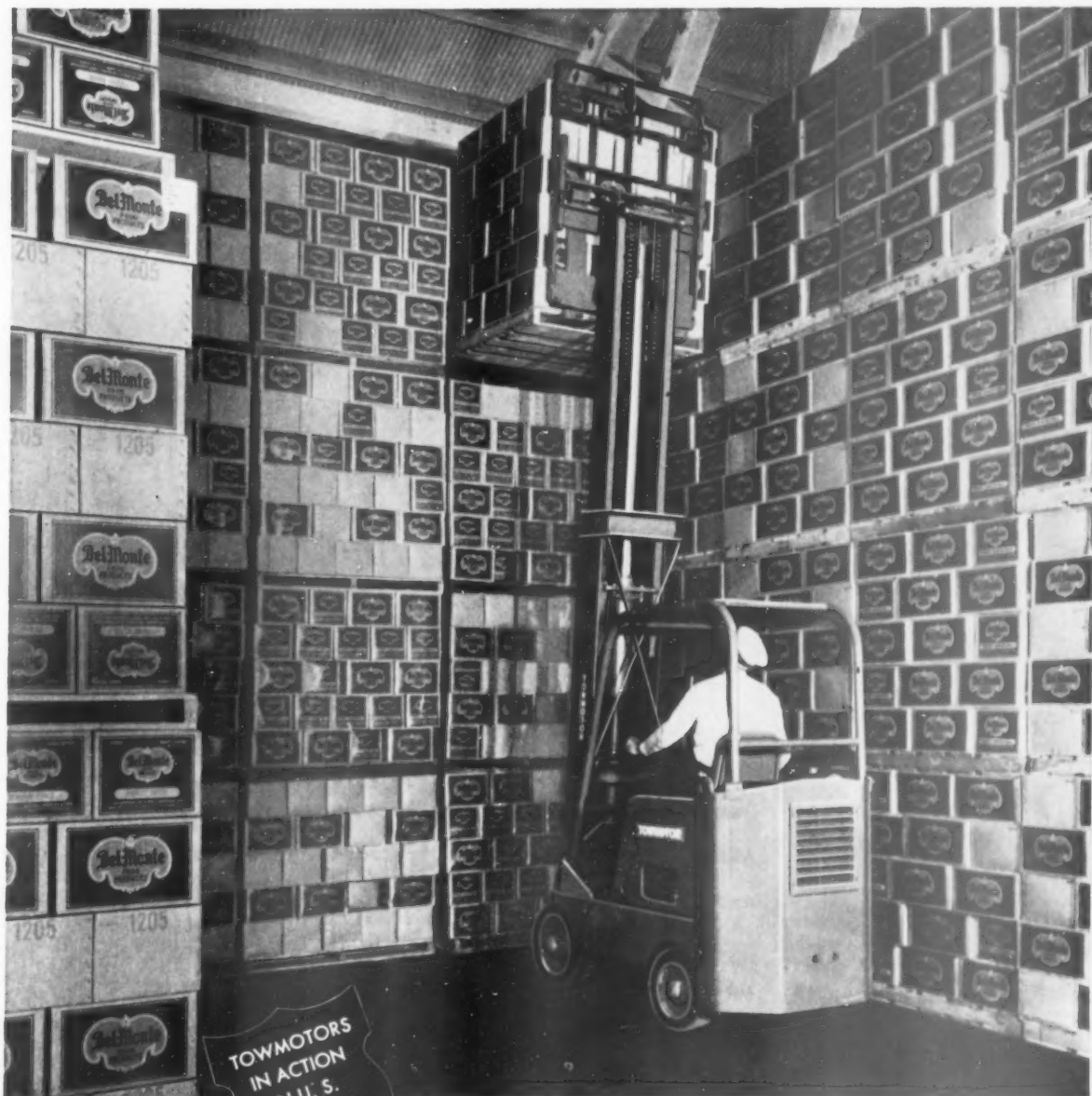
SUPER  
VIBRAPAC

SINTERING  
PLANTS

ACROW  
CENTERS

ROOF TILE  
MACHINE





**TOWMOTORS  
IN ACTION  
IN U. S.  
INDUSTRY**

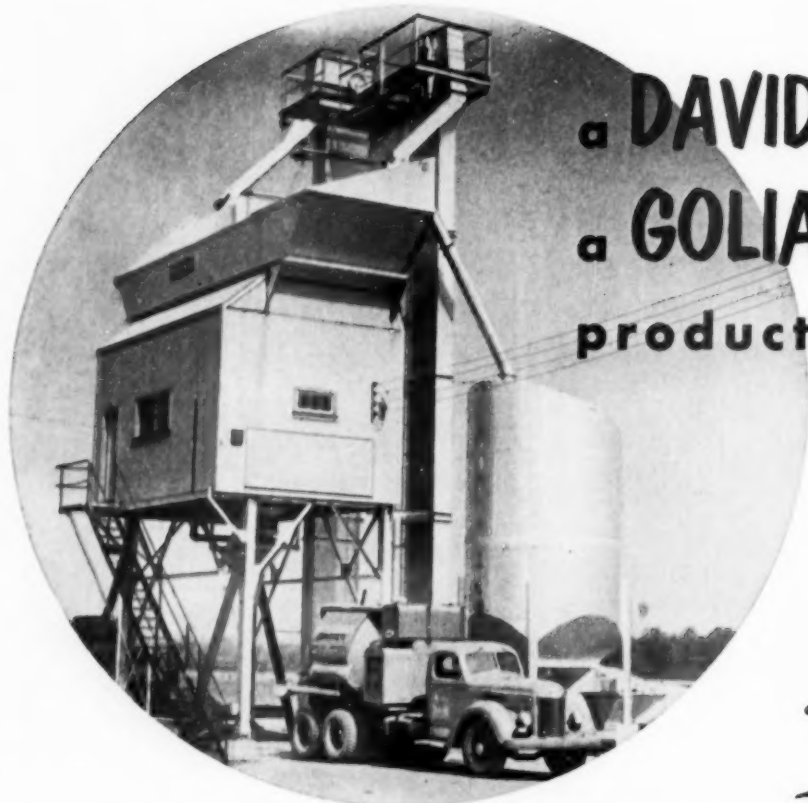
Stacking cases four tiers high at Alaska Packers, Alameda, California

**Stack Twice As High . . .** store twice as much, do it in half the time with Towmotor fork lift trucks. Towmotor handles *all* types of material. For the name of your nearest Towmotor Representative and a TOWMOTOR SAFETY KIT—a portfolio of safety tips and colorful plant safety posters—write Towmotor Corporation, Div. 49, 1226 E. 152nd St., Cleveland 10, Ohio.



**FORK LIFT TRUCKS and TRACTORS**

RECEIVING • PROCESSING • STORAGE • DISTRIBUTION



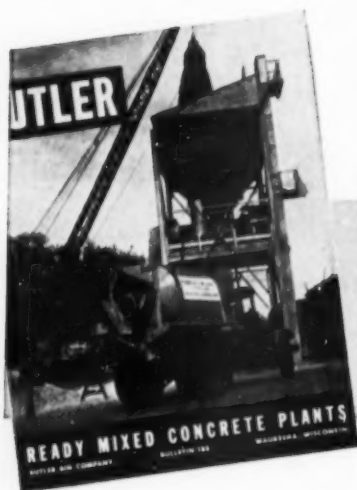
a **DAVID** in size ...  
a **GOLIATH** in  
production ...



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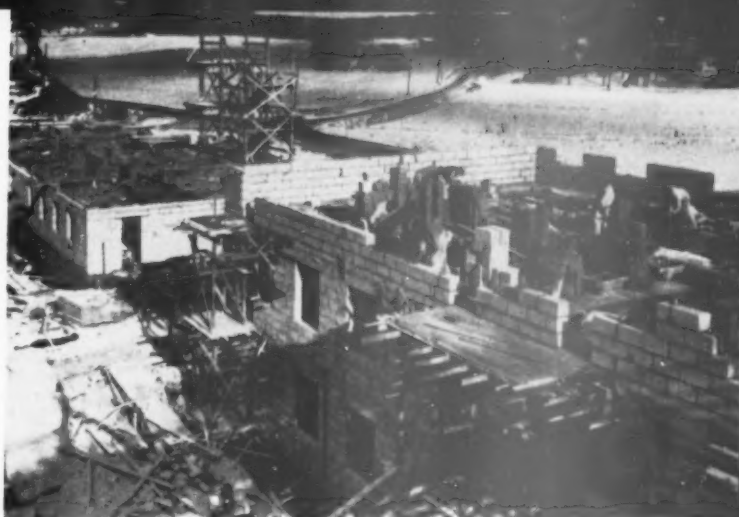


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Producers have developed great variety of concrete products. Prefabrication, prestressing, and cellular gas or foam concrete play important role in building

By F. O. ANDEREGG\*



Indurated cellular concrete block construction in Sweden

## DEVELOPMENT OF LIGHTWEIGHT PRECAST CONCRETE UNITS IN EUROPE

**B**EFORE THE WAR a considerable amount of investigation had been started in Europe on a study of the production and properties of lightweight concretes. The results of these studies had been summarized by Otto Graf,<sup>1</sup> and were reviewed by the author.<sup>2</sup> Three categories were under study: lightweight concretes made from *Bims* or the pumice aggregate found in the Eiffel; cement with or without sand, swelled up with gas produced by chemical action within the plastic mass; or by air whipped in such a mass and held by means of foaming agents.

### High Pressure Steam

It was recognized that curing under high pressure steam not only greatly increased the strength of the gas or foamed concrete units, but also produced a marked decrease in shrinkage. Now lightweight concretes that are cured at ordinary temperatures tend to show shrinkage in proportion to their lightness, reaching length reductions as great as 0.2 percent or more. Autoclaving reduces shrinkage and subsequent volume change on wetting and drying to a small fraction.

### Concrete Block

One of the most interesting regions in Germany west of the Rhine is Eiffel, which is full of extinct volcanos. These were active in comparatively recent geological times, something like 14,000 years ago. One of the larger of these blew up, leaving a large hole in which the Laach Lake

is now found. The pumice blown out by this explosion showered the countryside and was carried as far as the Schwarzwald. Underneath this deposit of pumice is found a tuffa, which is suitable for building. Underneath that, again, is found another and earlier volcanic product which is pozzolanic and bears the name "trass." It is said that the Romans used trass in the concrete they made in this region. There is one cement plant where the trass is blended with portland cement for special use in connection with water installations.

The deposit of light, loose material drains away all surface water readily, reducing the value of the land for agriculture. Therefore, it is to the advantage of the farmers to get rid of it. Then along came the Marshall plan and almost every farmer bought a block machine, sometimes hand operated and sometimes electrically operated, but placed on skids so that it could be moved around easily. Block are made and stacked adjacent to the machine till the space is filled and the machine is then moved to the next location.

It is said that there are over 2000 plants making these pumice block, ranging from a tiny hand machine to a large, completely mechanized operation. For the latter, a stripping machine may be employed, which simply moves the top soil over the bank into the stripped area. Here it can readily be spread out and used again for crops, this time with less trouble from excessive drainage. The uncovered pumice is then picked up by another machine and loaded into cars.

Found with the pumice are some heavier particles. These can be removed conveniently by washing, the reduction in freight cost making this

a profitable operation for the larger plants. The aggregate is either shipped to more distant plants, or used for masonry units nearby. This can either be done continuously on a production machine or on the smaller portable machine. Also, roof slabs with suitable reinforcement can be produced. For all of these units it is customary to use a dry mix and mold with adequate vibration.

These units can then be loaded onto trucks and shipped quite a distance. They are able to compete with other types of masonry units within a radius of 100 miles. The pumice producers have an institute which maintains a control laboratory at Neuwied on the east bank of the Rhine and not far from this district.

Some of the volcanos emitted lava, which is also used for making block. This aggregate is generally rounded, having been rolled up and down by alternate expulsive and gravity forces. Lava is also used in making block, which are naturally somewhat heavier than the pumice block. Producers are selling these block on a strength basis and depend largely upon mechanical equipment for handling. The author watched this operation in house construction, but felt that the speed of erection compared unfavorably with the use of cinder or pumice units or even brick. The lava does have real value for such purposes as trickle filters, however.

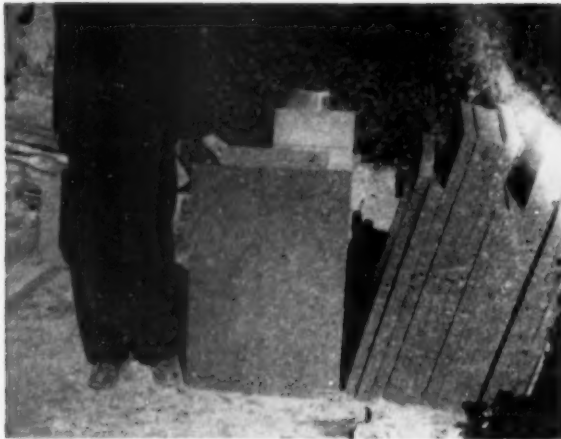
Masonry units in Germany are characterized by an almost bewildering variety of shapes and sizes. It seems as though each architect has to have his own special block. The machines are, of course, designed for ready change over, and with the low wages paid interchanging is not very expensive. Whereas in this country

\*Consulting specialist on building materials, Somerville, N.J.

1. Graf, Otto, "Schaumpcton und Leichtholbeton," Konrad Wittwer, publisher, Stuttgart, 1949.

2. Anderegg, F. O., "Lightweight Concrete in Germany," *Rock Products*, March, 1948, page 169.





Left: Tuffa stone ready for delivery to the job. Right: Pumice resulting from volcanic explosion in Germany

all block are completely pierced with cores, the Germans feel they need a large surface on which to spread the mortar. The block are then made so that the final top side is against the wooden pallet. This complete fifth side interferes with the internal ventilation of the wall. Partly to compensate for this extra path for heat loss, the system of holes is often made more complicated, as shown here. However, no one seems to have actually run heat loss studies on walls built from differently designed block to see which is the most effective.

A great many filler block are made for floor construction. These are designed so that their sides rest on light, prestressed T-beams or light steel channels. Again the ends of the block may rest on 4 x 4's until reinforced concrete placed on top has gained sufficient strength to support the weight. Window block, chimney block and other special forms are also available in many sizes and designs.

Block are also made from cinders, from recovered rubble aggregates, and in some places from sintered clays and shales. In other localities, of course, sand and pea gravel are used. An

economic study has been made by Dr. Trieber of the Institut fur Bauforschung in Hannover to determine the optimum size and weight for block. After considering handling costs and fatigue effects, it is recommended to try to obtain a block approximately 9 x 10 x 20 in. and weighing not more than 40 lb. It would seem that there is considerable room for adoption of a module and for simplification in masonry construction. The conventional continental wall in the past has been about 9 in. thick, or the width of two of their brick. Some are now advocating the use of fractions (which would be 10 cm., or close to 4 in.); they would use  $\frac{1}{4}$  and  $\frac{1}{2}$  of a meter, which would be approximately 10 and 5 in.

A very few American block machines are found abroad. One of these is in operation in the Netherlands by Bredero's Bouwbedrijf in the vicinity of Utrecht. Since the block made on this machine have been used by this company principally in its own housing construction, a great deal of missionary work was avoided. For laying the block ordinary laborers, with no special experience in masonry work, were trained and soon they were do-

ing very well. The Dutch did have difficulty in getting watertight walls with 8-in. block, however. After building two houses which gave trouble, this company has adopted the practice of constructing all outside walls of two 4-in. block, with a cavity between. The company has been operating its machine two shifts a day, but some slowing down is anticipated as defense production absorbs more and more of the available capital.

#### Gas Concrete Units

The phenomenal growth of the industry has been most evident in Sweden, although Germany is now using Swedish experience. Small plants were also visited in both England and the Netherlands. In Sweden two rival companies share the business and each has several plants strategically located in the country. Both are going into production in Germany. The two companies produced about 400,000 cu. yd. of masonry units in Sweden directly after the war, and this amount was nearly doubled in 1950. The living space per inhabitant in Stockholm has doubled since the war, indicating the size of the building boom.

For making gas concrete units, a high calcium lime or portland cement is mixed into a slurry with finely divided siliceous material. A variety of the latter is available in different places. Some grind sand very fine; others use fly ash. In some places a very fine sand is found naturally, while one company in Sweden has a deposit of oil shale next to a limestone stratum. Alternate layers are piled in an adjacent field and covered with partly burned material and ignited. The oil in the shale is sufficient to calcine the mass, producing silica and alumina by breaking down the clay minerals in the shale and calcining the limestone to form a high calcium lime. The calcined products are then ground very fine and mixed with water, aluminum powder and froth stabilizers.

This last step is common to all plants visited. Accurate temperature control is needed, so that the chemical



Electrically-operated block machine mounted on skids



reaction between the powder and alkali will set hydrogen free in the mass at a predetermined rate and produce a desired volume of gas. This mixture is poured into cars with removable sides, and run into a storage space where a fairly high temperature is maintained for something like 3 hr. By this time sufficient setting has taken place so that the cars can be removed from the chamber, and any excess material is cut off the top. The sides can be removed and wire saws cut the mass into units. These remain on the cars, which pass into an autoclave where they are indurated according to schedules set up for each combination of raw materials. In the larger plants the operation is highly mechanized.

In Sweden two types of masonry units are in extensive use. For smaller house construction, solid units are simply laid up in the conventional way, selecting a unit weight which will give the strength desired. The apparent density of the block so used may vary from 25 to 40 lb. per cu. ft. or even more. Since ideally every gas bubble is completely surrounded by a continuous wall, the absorption rates of the block are very low in comparison with their high porosities. This means that the masons do not have special difficulty in setting these units. Moreover, they like to use a straight lime mortar, preferably soft burned and mixed in a high speed mixer. (An article on mortars appears on page 77 of this issue of *ROCK PRODUCTS*.)

These pores obviously provide protection against freezing and thawing although, of course, such material is used under conditions where it seldom has a chance to suffer very low temperatures while in a saturated condition. If, however, the pores interconnect, much of these benefits will be lost. Nonetheless, the material will be able to "breath out" any moisture that may be present. This question of transpiration remains to be evaluated for gas concretes.

The Swedish building technicians feel that this theory of building construction is eminently satisfactory. However, the question of accumulation of condensate within the wall remains to be evaluated properly. Moreover, it is questionable whether having walls of such high heat capacity on the inside will provide maximum comfort. We do know from our experience with poured concrete houses in this country that comfort is poor, the body losing radiant energy all too readily to walls of such high heat capacity as concrete. The method of surfacing these walls with stucco has been described elsewhere (page 73).

### Foam Concrete Units

As long ago as 1926 the author encountered some preliminary work in Denmark on foamed concrete. Experiments were being made using certain protein materials or their partially hy-



Pumice loading machine



Cellular concrete block made from fly ash meet the approval of English masons

drolyzed products. Such substances as soaps, saponin and some of the alkyl-aryl sulfonated hydrocarbons show great ability in promoting and stabilizing foams, so that many of these have been used by a variety of investigators during the past 25 years. While the commercial results so far achieved have not been nearly as impressive as those accomplished with concrete block or gas concrete units, they certainly merit consideration.

One particular type of foam concrete production has been described in the article on European stucco (page 73), in which cement, fine sand and a foaming agent are mixed at very high speed with plenty of water and then applied to walls, usually by spraying. Considerable interesting work has been done under T. Whittaker at the Building Research Station in England.<sup>1</sup> For instance, with certain hydrolyzed proteins, foams are readily produced which may then be mixed with cement or lime and fine siliceous materials such as fly ash. Otto Graf has followed such developments with frequent reports published in Germany.<sup>2</sup>

Technicians of the English Pyrene Co., Ltd., having acquired considerable experience with foams for fire-fighting, have also applied some of their knowledge to making lightweight

concretes. During the Building Research Congress last September, the author had a chance to watch a demonstration of the process, which bears the name "Phomene." A foam is produced in a cylinder with a special "light concrete composition" and air under about 65 p.s.i. pressure. The foam is blown into the mixer and in with the cement and sand. Then the mix is poured into multiple molds. The company claims the production of block weighing 60 to 70 lb. per cu. ft. and having a "k" factor of 1.7 to 2.0 B.t.u. The demonstrators pointed out that the product can be autoclaved, but apparently not much had been done along this line. The company is also interested in pouring roofs. Such things as shrinkage, rate of drying and creep had not received much thought at the time of the demonstration. The compressive strengths obtained at ordinary temperatures were far from being impressive. Thus, with cement alone, products ranging from 25 to 50 lb. per cu. ft. had only compressive strengths of 100-400 p.s.i.



A large number of holes are incorporated in the block to reduce heat loss



Egg-shaped concrete pipe formed by vibrating extremely dry concrete

## Principles of Vibration

At this stage, if a concrete products manufacturer has been able to rig up some sort of vibration, he is usually quite happy about his product since this word seems to have a touch of magic about it. Now a great deal of power can be expended in vibrating concrete and concrete forms, and a large part of it can easily be wasted. An attempt is being made here to analyze the vibration operation.

Vibration requires energy and, like other forms of energy, has a quality factor and a quantity factor. The frequency may be regarded as the quality factor, while the amplitude is quantitative. The energy required for vibration is proportional to the square of the frequency and directly to the amplitude. Therefore, if the set-up could be devised so that the amplitude does most of the work rather than the frequency, economies might be anticipated.

However, vibration effects a "fluidizing" of the concrete mass, by setting the finest portions into vibration so that they will move about and permit the gravitational forces, sometimes assisted by extra pressure, to pull the larger aggregate particles as closely together as possible. The cement paste coating of the aggregate particles interferes with their packing, but if vibrated at the proper frequency the cement particles may be brought into a state of resonance, and such interference will cease. It seems that the frequency to produce this resonance varies inversely with the particle mass. So far as we have been able to ascertain this frequency is of the order of 9000-10,000 vibrations per minute. Obviously, to go to higher frequencies means wasted energy. The direction of the vibration is a factor and often when applied at right angles to the gravity pull seems to produce most effective results.

## Types of Vibration

Three types of vibrating equipment are in commercial use: mechanical, magnetic and pneumatic. The simplest way to produce a mechanical vibration is to mount a motor with an eccentric load, whereby the speed of rotation

controls the frequency. Motors operating at 7500 r.p.m. are in current use on many U.S. block machines. The frequency of the current determines the frequency obtained with magnetic equipment. The frequency obtainable from air under pressure seems to depend upon the air pressure, generally 150 to 200 p.s.i.

By using special motor-generator sets, it is not difficult to secure high frequency electric current and high frequency mechanical or magnetic vibration. Again, roll gears have given satisfactory performance by effecting multiplication of the frequency.

Vibration may be applied internally in the concrete or externally to the forms. If the internal vibrator can be moved about so that all of the concrete comes adequately under its influence, obviously the most efficient effect can be secured. Sometimes, however, the spacing of the reinforcement may prevent this so that it may be necessary to supplement by means of form vibration. Here obviously more or less damping of the vibration is to be anticipated. Hence the vibrator should be connected to the form as rigidly as possible. For each type of form, experience has demonstrated that best results can be obtained by certain methods and positions of attachment. It has been found most feasible with large steel forms generally to leave the vibrator running as long as convenient. It seems that a certain amount of work needs to be done on the concrete to secure the desired consolidation, and operating at a lower amplitude over a longer period of time seems to be easier on the bearings of the electrical equipment.

Europeans like the egg-shaped concrete pipe. This can be produced by mixing the concrete to an "earth-dry" consistency, which means just enough water so that a handful, when squeezed, will retain its shape. Large steel forms are used and set up with the vibrators attached, preferably by welding. Vibration is started and the dry mix is run in slowly and uniformly around the pipe. Finally a weight is placed on the concrete to secure a good end. The form can then be stripped off, the concrete having become sufficiently consolidated to maintain

its shape without sagging. A photograph of such an egg-shaped pipe in storage is shown at the left.

Similar methods used in placing the concrete in the Autobahnen have been very important factors in their quality. It is general practice in Europe to use dry mixes with effective vibration. The speedy release of the forms is of great economic advantage.

As vibration proceeds, and the concrete is settled, air bubbles tend to be squeezed out. However, experience has shown that it is extremely difficult to get rid of entrapped air bubbles on the underside of the given shape and next to the form. Some progress is apparently being made in Europe in getting rid of these bubbles, but the process has not yet been demonstrated to the satisfaction of the author.

An interesting demonstration can be devised by making up a batch of earth-dry concrete and vibrating it into a form with readily removable sides, preferably using an internal vibrator. Remove the form immediately and step on the fresh concrete. When the experiment is properly carried out the concrete will readily sustain a man's weight.

## Precast Concrete Specialties

With wood and steel in very short supply in Europe, an excellent opportunity has been provided for the development of a variety of concrete products. This development is well illustrated in the Netherlands where a considerable number of plants are busy with the production of a series of standard products and also some specialties. Some of the standard products are listed here.

Concrete pavement and floor tile, approximately 12 in. square, are generally made in a press. A small amount of wet mix is usually first placed in the mold and following that is a very dry backing material. At a pressure of about 1 ton per sq. in., this forms a well consolidated unit which may be picked up and put aside to harden. Very often the first batch contains marble chips of various sizes and colors. After hardening, these plates are ground to give a terrazzo finish and are in great demand for decorative flooring. For this purpose, an automatic grinding machine has been developed by Carlo Cassani Besozzo of Milan.

Curb stone are molded, usually with vibration, using a dry mix so that the form may be stripped immediately.

Concrete pipe, if circular, are made with a rotating troweling operation with vibration so that they may be removed from the machines at once. When an egg-shaped pipe is required, however, compaction is sometimes secured with pneumatic hammers or by form vibration. Some of the larger sizes are also produced by a spinning operation. The form is assembled and lubricated and placed in the centrifugal machine. It contains reinforcing which has generally been assembled in a machine which automatically welds

the wires into a basket. A long hollow mandrel is filled with the moist mix, introduced along the axis of the rotation, and then is emptied by inverting. Centrifugal casting is carried out at a definite speed and time schedule. The spinning generally leaves a beautifully smooth inner surface. The shapes may then be set on end and stripped after a short time.

Self-supporting L-shaped wall units, having a foot approximately half the height, are found very convenient for temporary retaining walls.

Among specialties are found precast fence panels, greenhouse structures, window frames and sashes, and various conduit systems. Garden furniture and flower pots are generally not much in evidence. In Milan are found some beautiful precast concrete masts. Units for bus passenger shelters are also made.

Almost all of the concrete is mixed very dry. For such mixing a rotating pan is commonly used in Europe, with countercurrent rotating blades and a bottom discharge gate.

### Floor Systems

Where wood is available it is the most convenient and economical material for building floors. Where it is in short supply or where fireproof floors are desired, other materials must be used. The most common system observed was the use of hollow filler block. These might be supported temporarily until a properly reinforced floor slab could be placed around them, though an alternate system used a light beam for supporting the ends of the block. The Kaiser light steel beam has been used with economy in Germany, so long as the steel was available. This consists of a pair of very light channels simply attached. Light T-beams either of prestressed concrete or prestressed ceramic tile are also being used for this purpose. A concrete topping is placed over the filler block to make an integral floor.

The Schaeffer prestressed floor slab is described later and is in use in Germany. Then a variety of precast floor (and roof) slabs are in use, much as in this country. These may be made from pumice, cinders, expanded slag or shale, or other lightweight aggregates. In Sweden a large number of precast Ytong or Siporex slabs are used in this way. Roof slabs may reach a length of 18 ft.

A floor system developed in Milan, Italy, uses a Rosacometta machine for making reinforced beams and top and bottom filler units. The cassette type of floor and roof slab made in the Netherlands is also shown.

### Prestressing Practices

These remarks are not intended to give a complete survey of the present status of prestressing in Europe. An example of the economic importance that has been reached in the prestressing might be cited. A bridge in Switzer-



L-shaped precast concrete units find ready application in Holland for retaining walls

erland was designed for steel construction. That material being unavailable, it was redesigned and built with prestressed concrete at a cost of about two-thirds of that for steel.

Such well established firms as Freyssinet are very busy with many engineers at work and new ideas are continually being introduced. The problem of anchoring the ends of the tensioning steel is very important and a number of patents have been issued on methods for this. This is avoided largely where the Hoyer system of wires stretched in a long form is used.

### Hoyer System

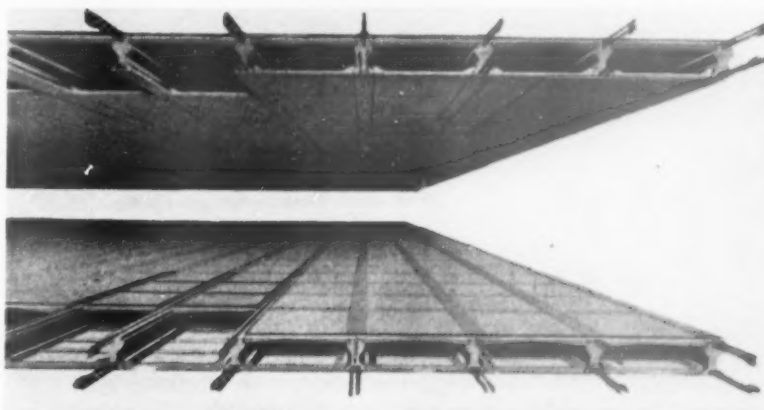
Cold drawn carbon steel wires, usually of about 2 mm. diameter, often twisted into pairs, are stretched in long forms or alleyways. The concrete is placed with vibration and after a minimum strength has been reached, which depends upon temperature and time, release of the wires puts the concrete under compression. The Schaeffer machine for precast floor slabs is an example of this and the operation of such an apparatus was observed in the plant of the Heidelberg Cement Co. near Heidelberg. A set of nine alleyways about 400 ft. long had been provided. In this system the wire pairs were pulled along the alleyways by hand and stretched with a hydraulic jack to a stress not great-

er than about two-thirds the yield point of the steel. A car mounted on rails and provided with three hoppers then was pulled along the alleyway. First a layer of high quality mortar was applied to surround the tensile wires and thoroughly vibrated with high frequency vibration. Next a layer of pumice concrete is applied to fill the middle part of the section, and finally a third layer of Rhine sand mortar produces a good finish. Cores are produced by a set of mandrels around which the pumice concrete is cast. These are moved with the machine by a series of jerks. Since a dry mix is used, the core holes maintain their shape reasonably well.

Another set of wires is stretched and the process is repeated. In periods of very wet weather, it may be necessary to sprinkle a little sand on the surface to keep the successive layers from sticking together. With the present tempo of rebuilding in Germany, this machine is kept busy with orders.

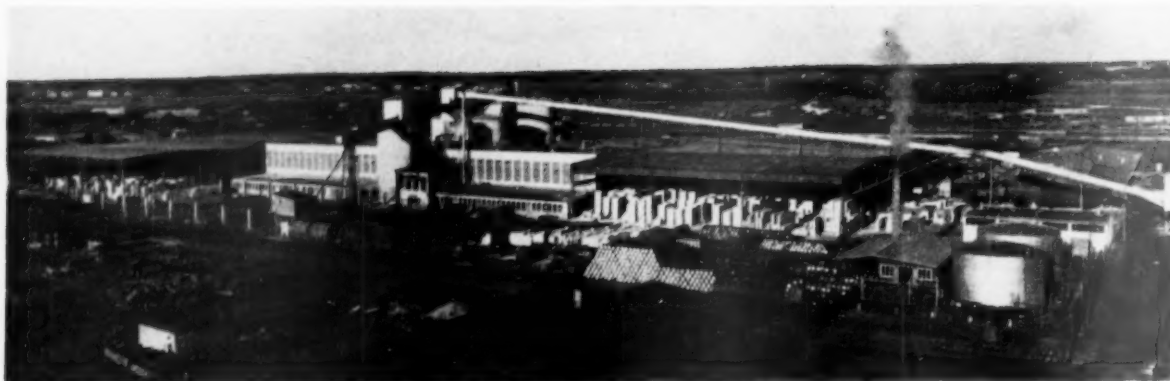
A somewhat similar operation called "Strangbeton" was observed in Stockholm in the plant of the Aktiebolaget Betongindustri where roof trusses and various beams are fabricated in a plant about 500 ft. long. The wires are stretched for about 400 ft., partitions separating the different members. The consolidation for the con-

(Continued on page 138)



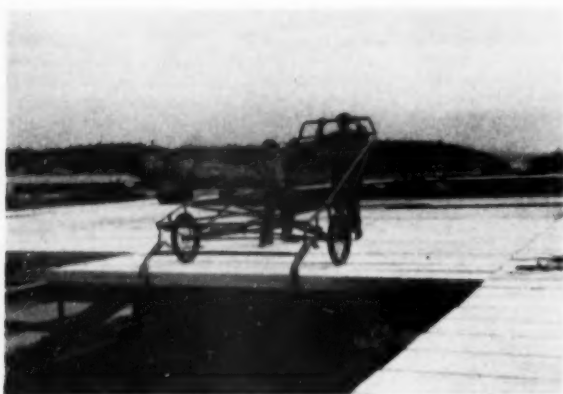
Italian floor system with top and bottom filler plates



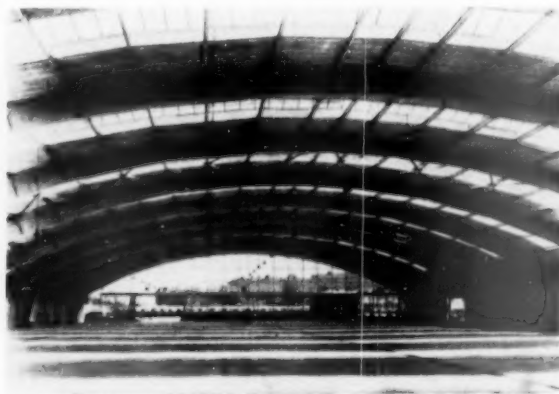


The Siporex plant at Gavle, Sweden, produces precast slabs, beams and block

## LIGHTWEIGHT PRECAST CONSTR



The precast slabs are placed directly on the steel construction, either by hand or with the use of a special carriage



Use of precast slabs in bus garage at Hornsberg, Stockholm

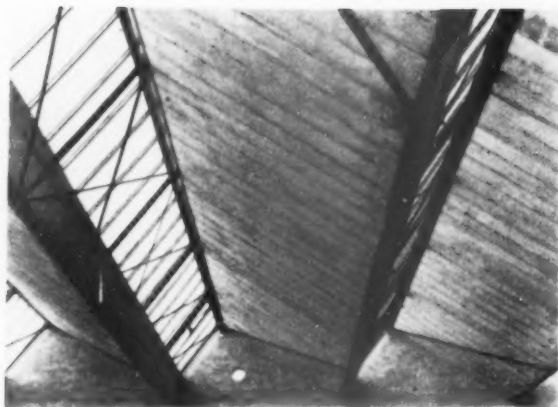


Left: Display of Siporex unit house at the 1950 building exhibition in Stockholm, Sweden

Below: Insulating slabs are placed next to a light form on the outside. Reinforcement is then placed, then the inside form. Structural concrete is then placed to complete the wall







Saw-shaped industrial roof using precast slabs



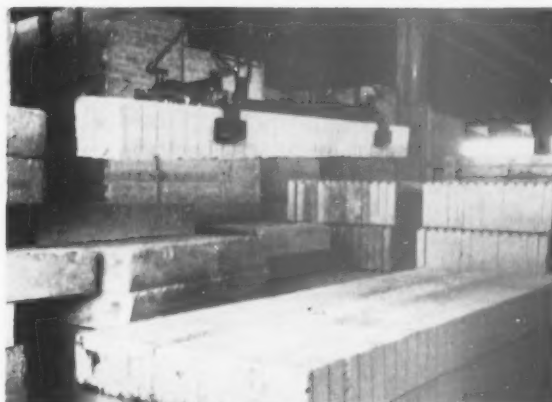
Lifting slabs for roof of industrial building

## CONSTRUCTION IN SWEDEN

Typical of European manufacturing methods and construction techniques are those used by International Siporex Co., Inc., one of the leading producers in Sweden



Precast reinforced slabs stored at the plant



Precast reinforced beams stored at the plant

The light reinforced beams are easy to handle



Mason placing Siporex block



Apartment construction in Stockholm





Cassette slabs used for roofing in Holland

crete is secured both with internal high frequency vibrators and also with the aid of form vibrators. It is convenient to let the latter run for some time during the filling of a set of long forms. Apparently suitable consolidation follows from the application of a definite amount of work. Given a frequency that causes "fluidization" of the concrete, compaction can be accomplished in a short time with a fairly high amplitude, or in a longer time at lower amplitude. Here the latter is more convenient to use. A minimum compressive strength must be reached before the wires are released. It is a simple matter to separate the different units in a form by burning off the wires.

Another application of this system was observed near Stuttgart. Pairs of wires about 200 ft. long are stretched and concreted to form T-shaped beams. A machine something like the Schaeffer machine forms two of these beams in one passage. Such beams are suitable for supporting filler block for floor construction.

The Leonhardt method of building prestressed concrete bridges is being applied around Stuttgart. A photograph is shown of one of these bridges over the Danube at Ulm, Germany. At each end a heavy, well reinforced

abutment is cast. The forms are built and cables are run around the abutment and through the main longitudinal beam forms. The wires are enclosed within iron boxes so that the concrete does not contact them. The concrete is placed leaving an opening between the ends of these beams and the abutments. Starting at about seven days, jacks placed in this opening are operated to place the concrete beams under compression, during which time the cables are being stretched. At intervals the compressing is continued until the full load is applied. The openings can be filled with concrete and finally the space around the cables is grouted. This method greatly simplifies the problem of anchoring, since there are only two ends to fasten instead of a hundred or more.

A novel method of end anchoring has been worked out for bridge building by Marco Ros in Switzerland. The ends of cold-drawn wires about 5 mm. in diameter are upset in a specially designed apparatus provided with electric heating so that a bead is formed on the end. These wires pass through holes in a special cylindrical fitting which is tapped to take a threaded bolt. By this means it is readily possible to stretch the rods with the help of a jack. Later the rods are protected by means of grouting.

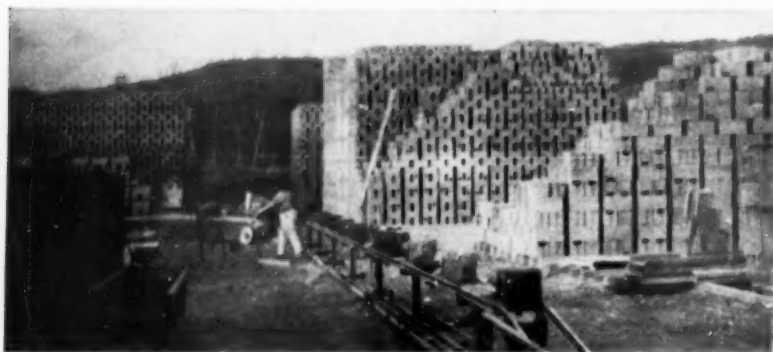
### Insulating Board

Considerable activity in the production of insulating board is in evidence in Germany and Switzerland. In Germany portland cement, magnesium, oxysulfate, and gypsum are all used as binders, while in Switzerland the bulk of the product is bonded with portland cement. Insulating board are typically about 20 x 80 in. and range in thickness from  $\frac{5}{8}$  to 4 in. These generally are used as plaster or even stucco base.

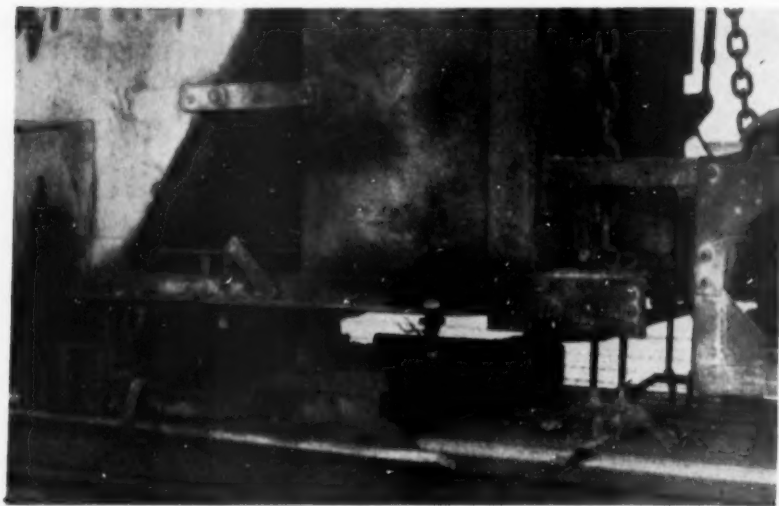
A fir shaving seems to give best results, although other soft woods are also being used. In one plant visited, fir logs are stored in the yard for about six months and are then cut into 16 in. lengths and planed into shavings 0.5 x 5 mm. In another plant the fir shavings from a woodworking plant are sifted to remove the fines. Wood fibers also obtained by a milling operation or sawing parallel to the grain have also been used. Pine wood may be used, but a high rosin content reduces the quality.

Where portland cement is to be used, a "mineralization" of the wood seems to be helpful. Experiments in this art have been reported by Graf with lime or hydraulic lime or portland cement, or limestone powder soaking for 24 hr. Sodium silicate solutions have also been tried. These treatments seem to be helpful. The patent art in this field is rather large, and each plant tends to depend upon some secret formula. However, cal-

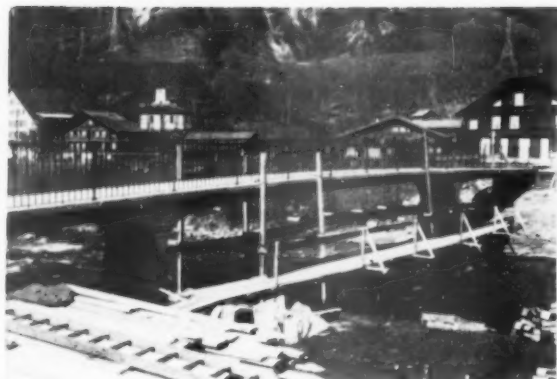
I. Graf, Otto, "Ueber die Herstellung und ueber die Eigenschaften des Betons aus Zement und Holzspaanen," Bauverlag, GMBH, Weisbaden, Germany.



Hollow block made from wood shavings and cement in Switzerland



Schaeffer machine for concreting prestressed floor slabs



Left: Ros prestressed bridge in the Alps. It cost one-third less than the originally designed steel bridge. Right: Leonhardt prestressed bridge over the Danube at Ulm, Germany



carious materials seem to be very helpful in neutralizing the acid and sugar contents which may be found in certain woods and which tend to interfere with the setting of portland cement.

The tendency in Europe in making all concrete products is to work with a sufficiently dry mix, so that after compaction in the mold a unit can be removed immediately or very shortly and supported on wood plank. In Switzerland, hollow block in large quantity are made of wood-portland cement mixes. These should be stored at least 28 days before use. They are laid up as in this country, but the hollow spaces are filled with concrete to provide structural strength. Floor and roof slabs with suitable reinforcing are also produced.

#### Binder Material

Professor Graf's objection to portland cement as a binder is that after repeated wetting and drying, marked reductions in flexural strength were noted. However, the Swiss product has been used successfully for 20 years or more; in this country, of course, similar products have been made on a smaller scale, with reasonably good results for a similar time.

The combination of wood fibers and portland cement is subject to considerable shrinkage during drying out, ranging from about 0.3 to 0.7 percent, depending upon the materials used. Care is needed to control the moisture content before application. When nailed rigidly in place with too high a water content the shrinkage may result in cracking. Great care must be used in application to exclude all moisture from the interior, because the resulting expansion may produce considerable warping.

The largest plant in Germany uses magnesium oxysulfate as a binder. The oxide comes from Austrian magnesite, while the sulfate comes from eastern Germany. The wood shavings are mixed with the oxide and sulfate solution and pressed between steel bands, which move through an oven to start the setting reactions. The travel is about 200 ft. The product comes out with very exact dimensions and sharp arisses. It is then stacked

for a day or two before shipment. This plant supplies about 40 percent of all this type of insulating board used in Germany.

#### Prefabrication

In southern Germany a woodworking company has developed a wall panel of medium size to fit in with its window and door frames. The panel is quite light and can be incorporated conveniently in a large number of designs. Wooden roof trusses are usually supplied, but the floor systems are more likely to be concrete placed over concrete filler block. This company calls its houses "Fertig Hauser" or "finished houses."

The unit panel consists of a peripheral wooden frame, to which are attached two sheets of portland cement-wood fiber combination, the space between being filled with glass wool for insulation. Foam concrete is used to surface these sheets. It is applied by screening back and forth several

times, requiring quite a bit of labor. These units, after curing, are loaded on a truck and delivered within a radius of about 300 miles.

Usually a foreman is sent along to supervise erection, which is mostly done by local labor. Sometimes the buyer of the house is able to do quite a bit of the work himself. People living in these houses seem to be very well pleased and appreciate their comfort.

The problem of joints between the panels has not yet been solved adequately, but they have hopes that a new isobutylene polymer may be satisfactory. An emulsion of polyvinyl acetate seems to give satisfactory service for painting these foamed concrete surfaces.

In the Netherlands, a system of prefabricated concrete building members and slabs has been developed. It took a lot of work to get the details of fabrication under sufficiently good control so the units would go together accurately in the field.

#### Concrete Slab Research

THE SOUTHWEST RESEARCH INSTITUTE, San Antonio, Texas, is conducting tests on a scale model of the first prestressed flat concrete slab of its type in the United States.

The results of the testing program will be applied in construction of the actual full-scale slab which will be used in the erection of a large laboratory building with the Youtz-Slick lift slab method of construction, developed by Southwest's affiliated Institute of Inventive Research. The full-scale slab, 88 x 38 x 1/2 ft., will serve as a roof for the new laboratory building and will be supported on eight columns with 24-ft. centers.

The object of the prestressed slab research program is to reduce the amount of steel and concrete required in fabricating slabs for large buildings of any type, and still maintain the strength of the conventional type concrete floor or roof.

Tests on the model will seek to determine factors concerning load, deflections, bending moments, stresses and strains and safety.

#### Concrete Block Plant

LALITE BLOCK CORP., Lake City, Tenn., a newly formed company, is building a plant at Lake City for the production of lightweight concrete block. Aggregates will be obtained from Lake City Lightweight Aggregate Corp. which operates an aggregate plant at Briceville, Tenn.

The main plant structure is 52 x 72 ft. and the kiln rooms are approximately 40 x 80 ft. Facilities also include a block machine with a 900 block per hr. capacity, cement and aggregate storage bins, boiler room, and an office building. The company plans to serve within a 50-75 mile radius of Lake City and will ship by rail and truck.

George Greenup is president and general manager of the new company. Other officers are Ray Franconi, vice-president, Dr. Charles Chiampi and Xavier Chiampi, secretary and treasurer. Carl Burnette is chairman of the board of directors. Mr. Greenup and Dr. Chiampi are also officers of Lake City Lightweight Aggregate Corp.





Left: The first bridge in the United States (near Hershey, Penn.) in which prestressed concrete bridge members were used for the superstructure. Erection took 1 hr. 15 min. The span is 24 ft. between existing abutments. Center: View of a two-span bridge near Hummelstown, Penn., where reinforced concrete bridge members of conventional design were used for the superstructure. Each of the clear spans is 34 ft. Right: Underside of the superstructure of the two-span bridge, near the center abutment. Eight members are in each span, including the two curb sections

## Pennsylvania Prestressed Concrete Bridge Members

**T**HE FIRST BRIDGE in the United States, using prestressed concrete bridge members, was erected near Hershey, Penn., in December, 1951 (see picture above); two other bridges of like design were erected in one day in the same locality. At this date, 33 bridges requiring prestressed concrete bridge members, including the three already erected, have been awarded the Concrete Products Co. of America, Philadelphia, Penn., by the Pennsylvania Department of Highways.

Erected in most cases on existing abutments, the clear spans range from 12 to 50 ft.; the largest of these bridges, near Harrisburg, will consist of five clear spans of 50 ft., requiring 45 prestressed concrete bridge members each 53 ft. long, 3 ft. wide and 33 in. in depth. There will be nine members in each span, including two curb sections, providing a roadway of 25 ft. 4 in.; this bridge is scheduled for erection in May, 1952.

Designed for the H20-S16 loading

\*Consulting engineer, Glenview, Ill.

By M. W. LOVING\*

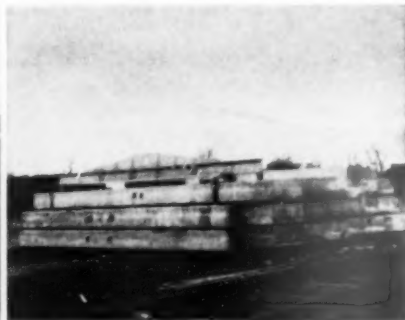
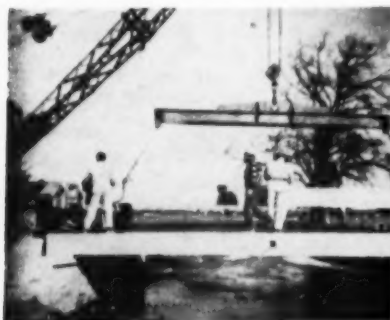
of the standard specifications for highway bridges of the American Association of State Highway Officials, these prestressed concrete bridge members require only about 25 percent of the steel necessary for reinforced concrete bridge members of conventional design; because the concrete is precompressed and always subjected to compressive stresses, there can be no shrinkage cracks or other defects. The steel cables take all tensile stresses and are bonded to and are protected against oxidation by the strong and dense concrete.

These prestressed concrete bridge members are manufactured at Pottstown and Pittsburgh, Penn., under controlled conditions and rigid inspection. They are delivered to the site, ready for erection; the cost in place is about 25 percent less than the cost of built-in-place reinforced concrete bridges of conventional and equivalent design.

### Reinforced Concrete Bridge Members of Conventional Design

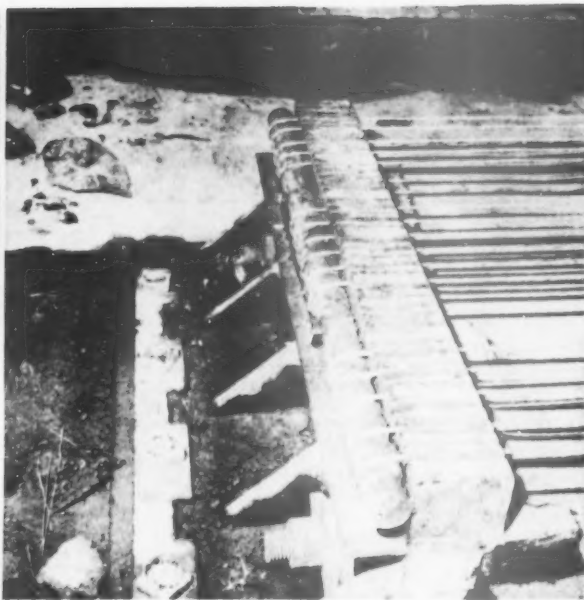
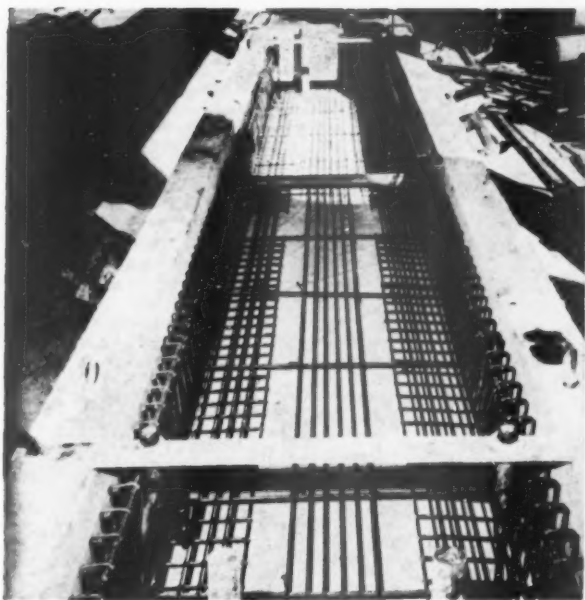
L. A. Porter, bridge engineer, Department of Highways, State of Pennsylvania, was the first to advocate the manufacture of these units in established plants under controlled conditions and rigid inspection. The Concrete Products Co. of America was the only firm willing to spend the time and money in the required research and development work. After extensive testing of all aspects of design of concrete mixtures and steel placement, in the highway laboratory in Harrisburg, the bridge members were manufactured and the first bridge was erected May 6, 1947, on existing abutments—in about 3 hr.—in Dauphin county, near Middletown.

Since then, and until December, 1951, about 40 of these bridges were erected in Pennsylvania. Typical of these bridge members of conventional design is the two-span bridge near Hummelstown shown in the pictures.



Left: Erection of the Hershey, Penn. bridge. The structure required eight members, each 3 ft. wide, 27 ft. long and 17 in. deep, providing a roadway of 22 ft. 4 in. Center: Two of the prestressed concrete curb sections. The ends of the steel cables are sealed with cement mortar in grooves provided for that purpose in the ends of the members. Right: Prestressed concrete bridge members in storage and ready for shipment from the plant of Concrete Products Co. of America; the steel strongback is used for handling and erecting the members





Left: Interior view of one of the molds on a stress-bed, showing the steel cables under tension and the steel wire mesh on the sides, ready for placement of concrete. Right: The anchorages for the  $\frac{1}{4}$ -in. dia. 7-strand steel cables. These are spaced 120 ft. apart and have a total capacity of 200 tons. The residual, or working stress, of the cables is 112,000 p.s.i. after shrinkage and plastic flow of the concrete and creep of the steel

### Prestressed Concrete Bridge Members

In June, 1949, Robert Petersen, president, and B. J. Baskin, chief engineer, Concrete Products Co. of America, flew to Belgium, England, France, Holland, Sweden and Switzerland. They investigated the design and manufacturing aspects of prestressed concrete units and structures of all kinds, which have been manufactured and used in those countries for many years because of the shortage and high costs of steel.

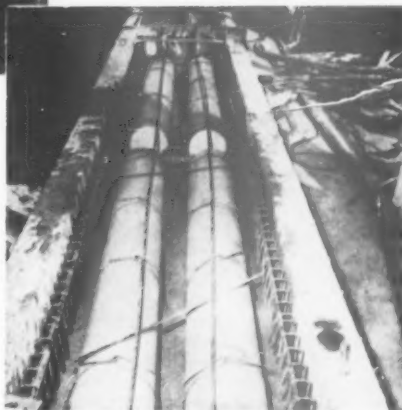
After their return to this country, they set to work to design and erect the required facilities to produce prestressed concrete bridge members, taking into account labor and other conditions in this country, which are different from those abroad.

The first prestressed concrete bridge member, 30 ft. long, 3 ft. wide and 17 in. deep, was tested at Pottstown, Penn., on May 20, 1950, in the presence of L. A. Porter, bridge engineer, Department of Highways, State of Pennsylvania; F. G. Schworm, engineer, Bureau of Public Roads, Washington, D.C.; Max Barofsky, consulting bridge engineer, City of Philadelphia, Penn.; J. B. Liebsch, structural design engineer, City of Philadelphia; Prof. Larry Mains, Drexel Institute of Technology, Philadelphia; Arthur R. Anderson, consulting engineer, Springdale, Conn. and many others. Designed for the H20-S16 loading already mentioned, or equivalent to a concentrated load at the center of the span of 23,000 lb., the prestressed bridge member actually failed under a concentrated test load—at the center—of 75,000 lb.



Left: Another view of the anchorages for the  $\frac{1}{4}$ -in., 7-strand steel cables. They are tensioned to 135,000 p.s.i. in groups of ten; every cable has the same elongation and stress and is held under this tension until the concrete has attained compressive strength of 5000 p.s.i.

Right: Prestressed concrete bridge members are made in three depths, according to clear spans. For spans up to 28 ft., the depths are 17 in.; for clear spans 30-36 ft., the depths are 21 in., and 33 in. for clear spans from 38-50 ft. The two paper Sonotubes are 10½ in. in diameter for clear span members up to 28 ft.; 12½ in. for clear spans 30-36 ft., and 24½ in. in diameter for members for spans 38-50 ft.



### Bond Strength of the Vacuum Treated Concrete to the Steel Cables

After the failure of the prestressed concrete bridge test member—the first and most important aspect of the test was the bond strength of the concrete to the  $\frac{1}{4}$  in. diameter, seven

wire-strand steel cables. When the concrete in the lower section of the member is precompressed, and the ends of the tensioned cables are released, a camber is induced in the prestressed bridge member. After testing to destruction, the engineers were amazed to see that there was



Closeup of a section of concrete taken from a prestressed beam tested to destruction. It can clearly be seen that there was no slippage of the steel cables in the concrete under load.

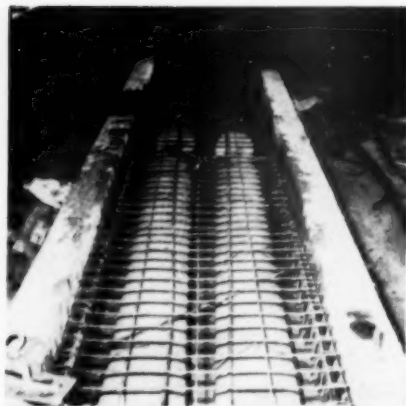
a distinct camber in each half-section—proving, beyond any shadow of doubt, that there was no slippage of the steel cables in the concrete, and the bond of the concrete to the steel was good.

The picture taken by the author of a section of concrete, from a test beam after rupture at Lehigh University last year, depicts the good bond of the concrete to the steel cables; there was no slippage, otherwise, the concrete would have been ruptured.

#### Approved Source of Supply

From the brief copy, pictures and their informative captions—the reader can see how these prestressed concrete bridge members are manufactured and erected.

To qualify as an approved source of supply for bridges built for the Department of Highways, State of Pennsylvania, the Concrete Products Co. of America had to prove beyond any shadow of doubt that the bridge



Right: After the molds are filled with concrete and vibrated, the excess mixing water is removed from the concrete by vacuum treatment. This assures concrete of great strength and density, and most important, good bond of the concrete to the steel cables.



Left: The paper Sonotubes extend to within 2 ft. of the ends of the members and are secured and held in place by steel wire to keep from floating to the top while concrete is vibrated and vacuum treated. The steel wire mesh and the steel rods at the top of the members take care of any tension that may develop due to prestressing.

members of conventional design, which have been manufactured for about 40 bridges since 1947, and the prestressed concrete bridge members are manufactured in strict compliance with the design and test requirements. This is certainly in the public interest.

Properly manufactured under controlled conditions, prestressed concrete units have all of the advantages, and none of the disadvantages, of reinforced concrete units and other struc-

tures of conventional design. They have many advantages over structural steel, if you could get it today; in fact, these prestressed concrete units are used to replace old steel bridges in Pennsylvania—the largest producer of steel in the United States.

Further information on the bridge members is available from Concrete Products Co. of America, 1505 Race St., Philadelphia 2, Penn.

#### Prepakt Concrete

A REPORT of the investigation by the Corps of Engineers on Prepakt concrete was given in the January, 1952, issue of *Highway Research Abstracts*. The purpose of the investigation was to develop data on the suitability of Prepakt concrete for mass concrete dams and for reinforced concrete construction. Prepakt concrete is made by packing the forms with coarse aggregate and then pumping in a cement-base intrusion mixture (grout) to fill the voids.

Two test structures were used in the investigation. One was a 72-cu. yd. test block, corresponding to a section of a dam. The forms were filled with coarse aggregate, graded from  $\frac{3}{4}$  to 3 in., and the block was grouted in three stages. The other structure was a 15-cu. yd. reinforced bridge pier, containing aggregate graded from  $\frac{3}{4}$  to 2 in. and grouted in one stage.

According to the report, it was found that placement of 3-in. coarse aggregate in a mass concrete form

presented no great difficulty; segregation in the aggregate was not a major problem, and form pressure remained high for as long as 20 hr., a fact to be considered in form design. The large block was grouted through horizontal pipe which remained in the block, and was accomplished without undue difficulty. Normal procedure would have been to grout through vertical pipe, which could have either been withdrawn or left in place, as was done in grouting the bridge pier.

High compressive and flexural strengths were obtained for cores drilled from the block and high compressive strengths for the bridge pier cores. Bond of the Prepakt concrete to precast concrete and to a limestone slab was reported to be good where the surfaces were first prepared by sandblasting, but poor or lacking where such preparation was not made. Void counts on cut core sections indicated a low void content in the hardened paste, believed to be due to the slow pumping schedule which may have permitted the evolution of gas

in the intrusion grout to occur in the mixer reservoir and pipe lines, rather than in the concrete. Tests on permeability will be made and reported at a later date.

Tests completed indicate that mass concrete having high strength and adequate durability can be made by the Prepakt method with a portland cement content of less than 2 bags per cu. yd., and that a reinforced concrete of good quality can be obtained by this method with a cement factor of approximately 4 bags per cu. yd.

#### Purchases Pipe Plant

R. A. FERGUSON, Amarillo, Texas, recently purchased the concrete pipe manufacturing plant from Plains Concrete Co. and is expanding plant facilities.

#### Purchases Block Plant

W. J. EEDS AND A. V. TURNER, Seminole, Okla., have purchased the Raper concrete block plant in Seminole and will operate it under the firm name of Tri-Cities Concrete Products Co.

# IOWA CONCRETE CONFERENCE HIGHLIGHTS

**A**BOUT 100 PERSONS from Iowa and surrounding states attended the Third Annual Better Concrete Conference at Iowa State College, Ames, March 20 and 21.

The conference, conducted under the immediate auspices of the Engineering Extension Service and the Department of Theoretical and Applied Mechanics, was a joint enterprise with the Portland Cement Association, Iowa ready-mixed concrete industry, Iowa Highway Commission, cement companies, and other users or potential users of concrete.

Following introductory remarks by G. Ross Henninger of the extension service, there was shown the excellent 30-min. film prepared by the University of California on trial batch proportioning.

James W. Johnson, laboratory chief, Iowa Highway Commission, in a paper on the coordination between job and laboratory, covered much useful material including data on the relative desirability of beams vs. compressive specimens. His broad experience indicates that the two types can be expected to give about equally reliable and uniform indications, and that the choice in the highway field should be on the basis of facilities readily available for controlled fabrication, storage and testing. Mr. Johnson showed representative molds and other small equipment, including the indentation ball weight developed at the University of California, for measuring the consistency of fresh concrete. The ball indications appear to be more consistently reproducible than are successive measurements of slump.

J. H. Banker, construction superintendent, Portland Cement Association, Chicago, Ill., gave a practical discussion of job problems, including many valuable pointers on plant, placement, forming and protection.

Mark Morris, Iowa Highway Commission, chairman of the American Concrete Institute committee on curing and also active in the Highway Research Board in the same area, discussed the care of concrete after placement, covering the major applications other than precast products. There is a striking lack of uniformity in the countrywide curing requirements for pavement concrete, especially as regards the length of the formal curing period prior to service.

At the Thursday evening dinner, Prof. H. J. Gilkey pointed out the great divergence in the strengths attainable from the same concrete differently cured. He discussed the effects of both temperature and moisture.

The Friday forenoon session was devoted largely to air entrainment. Prof. S. J. Chamberlin and Prof. H.

O. Ustrud gave a laboratory demonstration of air entrainment, displaying the effect of air on workability. They drove home the point, that air-entrained mixtures should always be redesigned to take advantage of the lowered water-cement ratio that can be used.

N. T. Rykken, general manager, Whitney's Ready-Mix Concrete Co., Duluth, Minn., discussed field and laboratory practices with regard to air entrainment, with special reference to ready-mixed concrete. He covered such items as plant practices, gradation of aggregate, use of air-entraining cement vs. adding the agent at the mixer, design of air-entrained mixtures, relative costs, and use of air entrainment with admixtures other than air-entraining. He also covered field problems: loss of air in transit, vibration and over vibration. Precautions and corrective measures were suggested.

William Lerch, manager, Department of Applied Research, Portland Cement Association, Chicago, brought out some of the newer developments in air entrainment, including grading and temperature. While air entrainment constitutes one of the greatest of modern developments in concrete, it is not a cure-all, he emphasized. It will do little for example, toward offsetting the bad effects of an inferior aggregate. A given amount of an air-entraining agent is more effective in cool weather than in warm weather and in a lean mix than in a rich one, he said.

Charles E. Wuerpel, technical director, Marquette Cement Manufacturing Co., Chicago, discouraged the idea, that extra cement constitutes a valid factor of safety for concrete. Use of cement in excess of that required to produce the strength needed is a liability, largely because of the added volume change which varies primarily with the cement content. Mr. Wuerpel, one of the pioneers in the use of air entrainment, emphasized his continued belief, that air entrainment is desirable in virtually all concrete; that the added workability and placeability are on a par with the added durability for which the efficiency of air entrainment was first recognized.

Earl E. Eckert, construction superintendent, George A. Hormel Co., Austin, Minn., discussed heavy-duty concrete floors. He designated water as the most important single ingredient of concrete. Any excess of water invites over-manipulation with float and trowel, always drawing more of the undesirable ingredients to the surface. A tough well-graded aggregate is another indispensable. For heavy-duty floors, he considers some of the hard igneous rocks, high in silica, superior to softer calcareous materials. As

a floor surfacing mixture (either bonded or monolithic) he uses water-cement ratios as low as 3.5 gal. per sack, and cement factors as high as 12.3 sacks per cu. yd., giving 28-day strengths up to 7000 p.s.i. The whole technique is specialized and exacting, especially as regards avoidance of any excess fluidity or water gain. A bonded surface is likely to fail if the temperature between base slab and topping mixture exceeds 5 deg.

Following a brief outline of prestressing by Marts D. Blue of Des Moines, Iowa, Professors Ustrud and Chamberlin staged a demonstration test to failure of a small prestressed, pre-tensioned concrete beam, reinforced with piano wire.

Following the evening dinner, Carlos D. Bullock, regional structural engineer, P.C.A. of Kansas City, gave an illustrated summary of progress and possibilities of prestressing, it being clear that already within the last year or two, prestressing has advanced beyond the purely experimental stage it had so recently occupied in this country.

The conference included an inspection of the concrete features of the new addition to the Memorial Union at the college, and an interesting panel discussion under Professor Chamberlin, the panel consisting of the out-of-state experts.

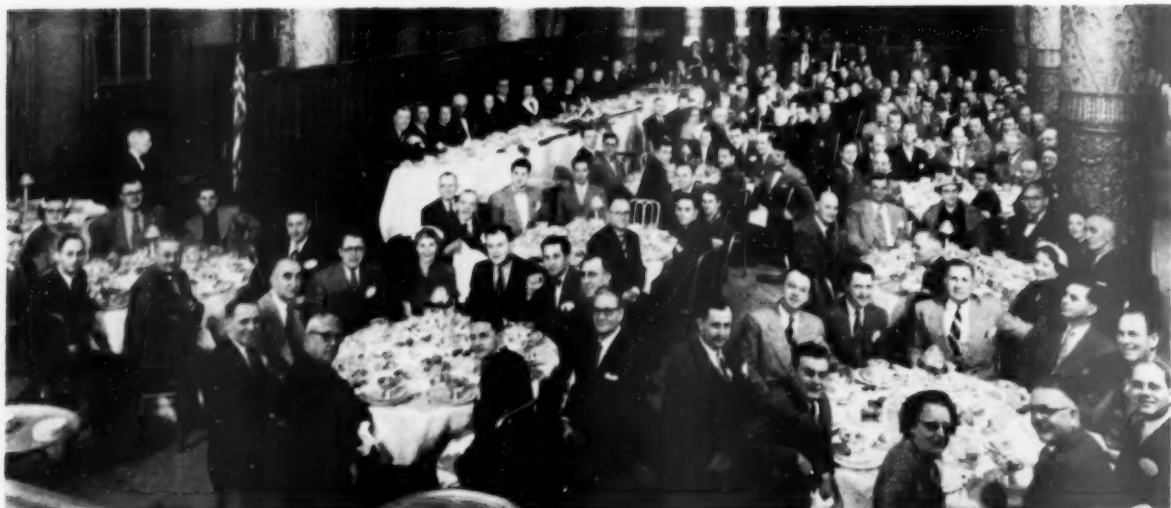
## Vermiculite for Fishing Boats

A NEW USE for vermiculite concrete has been found by the Canadian Fishing Co., Ltd., of Vancouver, B.C., namely, as a floor fill in the holds of fish packers. Fish packers are ships that pick up the catch of small fishing craft.

Some kind of floor is needed to provide a level working surface in the hold of the ship and to keep the fish out of bilge water, melted ice, etc., that collect at the bottom. When wood planking is used, slime collects underneath and the cargo is apt to become contaminated. Since the value of a single load may run as high as \$50,000, careful handling is of utmost importance.

The most permanent, economical and sanitary floor is concrete, but sand concrete adds considerable weight to the vessel, which cuts down the pay load, particularly if the ship has deep framing. The required thickness of concrete may be as much as 30 in. amidship, tapering to 10 in. in bow and stern. Lightweight vermiculite concrete was found to be ideal for a fill of such volume. In one ship of this type, it eliminated 21 tons of dead load that could be translated each trip into fish-carrying capacity.





Banquet of the Wabash Valley Ready Mixed Concrete Association, which changed its name to Midwest Ready Mixed Concrete Association at the annual meeting

## MEETING READY-MIX SPECIFICATIONS

**Midwest Ready Mixed Concrete association holds first meeting under new name. Midwestern producers also discuss legislation and cost reduction**

**T**HE TENTH ANNUAL convention of the Wabash Valley Ready Mixed Concrete Association had an excellent attendance in Chicago, Ill., March 24 and 25. This association is one of the more aggressive regional organizations serving producers anywhere and took steps, at this meeting, to broaden and enlarge its membership. Active membership was increased from 87 to 104 during 1951 and members have a combined total of 869 truck mixers. Thirty-eight associate members are affiliated with the group.

Due to its expansion both in membership and influence of its operations, it was decided to change the name of the association to Midwest Ready Mixed Concrete Association which more closely identifies the group with its field of coverage.

### Program

The program covered the subject of problems in furnishing controlled quality ready-mixed concrete, cost accounting, the future for highways, price regulations and Washington developments. A highlight was a trip to the new Portland Cement Association laboratories for research and development by invitation of the P.C.A. The final session concluded with a general business meeting at which the annual reports were heard and officers and directors elected.

President C. S. Ward, Nelsen Concrete Culvert Co., Mount Vernon, Ill., began the convention by summarizing the growth and activities of the organization. Five director's meetings were held during 1951 and the fourth annual short course held at the Uni-

versity of Illinois was a great success. Mr. Ward gave the reasons for changing the name of the association and told of plans to be discussed later for providing awards in an essay competition for students at Rose Polytechnic Institute, Purdue University and the University of Illinois. Mr. Ward concluded his talk by thanking the associate members for the reception given with their courtesy and by expressing his appreciation to the officers, directors, membership and trade press for their cooperation.

### Cost Accounting

F. M. Barnard, Nelsen Concrete Culvert Co., Champaign, Ill., presented a talk, "Your Selling Price—Does It Include Hidden Costs?" He first passed out mimeographed sheets with breakdowns and figures so that questions could be asked and discussion stimulated. His figures and calculations covered cost data for materials, plant overhead expenses and delivery expenses, using standard cost accounting procedures. In discussing the handling of material costs, he showed how failure to compensate, by quantitative additions, for moisture in the aggregates can amount to 1 or 2 percent of costs. In order to minimize weight losses, he suggested that batching scales be checked each morning for accuracy.

According to his figures, which estimated the life of the unloading pit, storage bins and tunnels as 20 years, the overhead is about the same whether production is 2000 cu. yd. or 20,000 cu. yd. Proper inclusion of salaries for owners and managers was stressed

as essential to an accurate cost picture, as was insurance.

### Highways

J. D. Lindsay, engineer of materials, Division of Highways, Springfield, Ill., in a talk entitled "Looking Ahead," discussed the needs and outlook for highway construction. He started with the beginning of highway construction from the turn of the century and traced the development, and also the changes in our social and economic life that have resulted because of highway building. He expressed the importance of highways in terms of national business and employment. One of every eight jobs, for example, is associated with highways in some way.

It was relatively easy to get highways built in the World War I era, he said, because there was much money readily available, engineers were easily obtained and rights of way were more attainable than they are today. In the middle thirties most states had completed their primary system of roads, to be followed by new problems and the depression. Then came the deteriorating effects of heavy use which was accelerated during World War II at a time when work was limited to a maintenance job. Financing was bad following the war and there was very little emphasis on roadbuilding until existing roads began to show the full effects of neglect and wear. Studies then started which have disclosed, in Illinois alone, a need for \$3 billion to bring the roads into shape.

We have now reached an era, he



said, of modernization and extension of highways at a time when problems are mounting, including financing, shortages of engineers, etc. It is not fair, in Mr. Lindsay's opinion, for the motor users to pay all the costs because highways benefit all people.

As far as ready-mixed concrete is concerned, its use is growing in importance in the building of Illinois highways. He estimated that one-third of all the concrete used on Illinois highway projects was from ready-mixed concrete plants in 1951. The total was about 300,000 cu. yd. including state, county and city projects, of which one-third was mixed in transit. In addition, some 8000 cu. yd. were required for maintenance work.

Some complications arise due to transportation and delays and also because the addition of mixing water, the speed and amount of mixing are up to the driver. As a result the highway engineers find it necessary to have close inspection even though the part used for their work is but a small fraction of total volume being produced at a given plant.

Evaluation of the batching and mixing equipment constitutes an additional problem as do improper maintenance and operation. An effort is being made to standardize on a policy for better control.

In answer to a question as to procedure in inspection where only a

includes proportioning, selection and all the factors involved in producing the concrete.

Among the types of specifications are those which (1) fix the cement content and slump, (2) prescription types which set the proportions in terms of pounds of aggregates, (3) those which fix the minimum cement content and maximum water-cement ratio (which gives the producer latitude in economical production), (4) those which in addition to establishing the minimum cement content and maximum permissible water-cement ratio establish minimum strength requirements, and (5) those which specify compressive strength only.

The first two types require only that batching be accurate with some attendant complications, in connection with air-entraining agents, whereas contractual problems are involved in the others. One of the greatest difficulties is the time element where 28-day strengths are governing. A complication is that measure of quality not only depends upon the actual quality of the concrete but on the quality of the testing. Inadequate sampling and the many variations associated with testing give great opportunity for inconsistent results and variations. The details of molding test specimens, temperature conditions of testing, handling, shipping, curing, capping, etc., give a lot of opportunity for error.

Specifying concrete on a strength basis is considered a good basis by Mr. Walker, but the question is how much to over-design in order to have minimum rejections and yet achieve economies. Mr. Walker offered to help producers in this regard, if they have the problem.

Mr. Walker gave some rule-of-thumb figures to show the effects of variations in mixes. Four sacks of cement would yield a strength 65 percent of that for a 5-sack mix and a 6-sack mix would yield 135 percent of the strength of a 5-sack mix. Each gallon of additional water would reduce compressive strength 100 p.s.i. in a 4-sack mix, 135 p.s.i. for 5-sack concrete and 165 p.s.i. for 6-sack concrete. Expressed differently, one added gal. of water would decrease compressive strength by 20 percent and 2 gal. will reduce it by 36 percent. Use of 1½-in. coarse aggregate as compared to ¾-in. aggregate would increase compressive strength by about 15 percent.

Discussing quality control generally, he stressed the need for uniformity of materials and all operations. Handling in stockpiles and bin design are to be considered in attaining uniform grading, whether by the producer or supplier of aggregates. Mr. Walker recommended, as he has done before, that coarse aggregate over about 1-in. size should be provided in at least two separated sizes. Also important is to take necessary steps to minimize variations in moisture through stockpiling and adequate

drain time. He said that there now are available several means of quickly determining moisture content of sand within an accuracy of ¼ percent.

Because of known variations of strength when cements from different mills are used, he said that when concrete is supplied on a strength basis the design should be in terms of the lowest likely strength in order to avoid failures. Air entrainment is definitely considered a great advance but presents problems in control because excess air results in great decreases in strength. For a given water-cement ratio, one percent entrained air reduces compressive strength in concrete by about 5 percent, for 2 percent the loss is 10 percent and for 5 percent it is 25 percent loss. Cutting back on the water and fine aggregate when designing for air-entrained concrete cuts the loss. The use of an admixture is to be preferred to mill-ground air-entraining cement in Mr. Walker's opinion in order to give more control in designing different concretes. It was also questioned whether the agent as added in a cement mill in small quantity would be uniformly distributed.

Makes of mixers, mixer speeds, size of batch, discharge control, the use of CaCl<sub>2</sub>, cold weather, hot cement, use of lightweight aggregates, etc., were also mentioned as introducing variables. He concluded by saying that there is need for work to be done on the sizes of batches relative to mixer revolutions and that work is to be done on that subject.

### Socialism in the U.S.

One of the scheduled speakers at the second session, Walter H. Acheson, chief, Building Materials Branch, Office of Price Stabilization, Washington, D.C., was unable to attend the meeting. Instead, a talk entitled "Socialism U.S.A." was presented by Marshall D. Abrams, managing director, Construction League of Indianapolis. The sharp picture of the trend toward socialism painted by Mr. Abrams was not very happy. Further moves toward socialism depend on the influence of labor leaders upon the government, he said. If labor doesn't believe in a free market economy, the chances are we will have a socialistic government, the speaker warned.

The present government is not socializing property but income, and is setting up a system of directives to channel the economy since it was felt the old give-and-take economy was "too harsh and unnecessary." The government has introduced ten weapons in this program, among which Mr. Abrams mentioned the progressive income tax (based on ability to pay), rent control (which "has destroyed the incentive to build rental properties") and public housing. The latter is particularly bad, Mr. Abrams said, for it means that people who want to buy homes will also be helping to pay for public housing all over the country.



Charles P. O'Leary, Terre Haute Concrete Supply Corp., Terre Haute, Ind., left, presenting honorary membership certificate to Clarence C. Deal, Elkhart Gravel Corp., Elkhart, Ind.

small percentage of total concrete put through a batching plant is for highway use, Mr. Lindsay said that it is impractical to have an inspector at the plant continuously and that it is the practice to inspect everything that is put through a plant. The problem of adequate inspection for highway use is difficult of solution.

### Controlled Quality

In his talk, "Review of Problems of Furnishing Controlled Quality Ready-Mixed Concrete," Stanton Walker, director of engineering, National Ready Mixed Concrete Association, emphasized the difficulties associated with meeting the various types of specifications. In review, he mentioned these classes of specifications, which range from those which relieve the producer of most of the responsibility to other types where the producer has complete responsibility for quality which



Officers of the newly named Midwest Ready Mixed Concrete Association are, l. to r., R. E. Hutchins, association secretary; C. S. Ward, Nelson Concrete Culvert Co., Mount Vernon, Ill., retiring president; R. J. Hummel, Consumers Co., Chicago, Ill., vice-president; Donald Moritz, C-J Ready Mixed Concrete, Effingham, Ill., director; Ernest Horne, Ready Mixed Concrete Corp., Indianapolis, Ind., president; L. L. Shidler, Triangle Construction Co., Kankakee, Ill., director; Miss Harriet Bell, Zimmerly Construction Co., Paris, Ill., director; John H. Rudolph, Concrete Supply Co., Evansville, Ind., director; and Andrew F. Bieker, Bieker Co., Hammond, Ind., director

Mr. Abrams quoted James Byrnes, now governor of South Carolina, as making the apropos statement "Be-ware of someone who promises to give everyone something that does not be-long to him." This is very true today, Mr. Abrams warned, so that every businessman should become more aware of what is happening in the country and "devise some way to head it off." It is fast becoming the condi-tion where the public will hold title to property but the government will take the income.

#### Developments Affecting Business

Events of interest happening not only in Washington but over the country were mentioned in an off-the-cuff talk by Vincent P. Ahearn, executive secretary, National Ready Mixed Concrete Association, Washington, D.C. An improvement in the construction picture is evident, according to Mr. Ahearn, and this will be spurred by relaxation of N.P.A. controls. The construction program won't be as large as the country needs, he said, but the increased activity will certainly help.

Producers must live in peace with their communities. The best way this can be accomplished, suggested the speaker, is to operate a safe company. And it is the executive safety con-sciousness that is responsible for the record, good or bad.

From safety Mr. Ahearn jumped to a more treacherous subject—wage and price controls. Wages can be in-creased 10 percent over January, 1950, and 4½ percent over January, 1951, he reported. Further equalization of inequalities is also permitted, how-ever. Mr. Ahearn said that many re-ports have come to his office of unions demanding pay increases on the basis of construction industry increases. The construction commission which sets those raises has no jurisdiction over the ready-mixed concrete indus-

try, and therefore cannot influence its wage scale. Many producers are los-ing more than just pay increases, for Mr. Ahearn said that some employers sign agreements with unions without reading the fine print, but with seri-ous consequences. Some agreements sign over all management duties to the union, and since these are con-tracts, they are enforceable in civil courts. "There is an abdication of re-sponsibility," Mr. Ahearn said, "on the part of producers with respect to collective bargaining." That was one reason why he pointed out the ad-vantages of area bargaining.

National Ready Mixed Concrete As-sociation's new group insurance plan, limited to association members only (by law), was described by Mr. Ahearn. Its features, he said, will go far towards offsetting many union demands.

#### Price Controls

The ready-mixed concrete industry has been treated with inconsideration at top levels, "motivated by sheer malice," for that was the only ex-planation possible, Mr. Ahearn said. The industry never received benefits extended others, besides having to op-erate under the General Ceiling Price Regulation with its base period more than a year old. Furthermore, the Capehart Amendment was written knowing the ready-mixed concrete in-dustry would not qualify. One of the saving factors for many producers—the heating price charge—may meet with an adverse ruling from O.P.S. soon, the speaker stated.

Mr. Ahearn admittedly went out on a limb in making his predictions of some events during the year. Congress will extend controls for another year, he thought, though specific decontrols will be established. Much of the leg-islation coming out of Washington re-sults from Congressmen not knowing the facts—the facts that only the citi-

zen and businessman can supply. Since Congress is the last bulwark of our democracy, Congressmen must be given the facts of public desires, Mr. Ahearn concluded.

#### Business Meeting

Association business was transacted at a luncheon meeting, during which the group was told of "Steel's Golden Age" by E. C. Logelin, director of public relations, U.S. Steel Co., Chi-cago, Ill. This history of steel making was illustrated with many colored slides.

A second resolution, besides the one passed changing the association name, was also adopted unanimously. This called for promotion of the in-dustry and the association to engi-neering schools. One method already planned is to have an essay contest among engineering students at Rose Polytechnic Institute, Purdue and the University of Illinois. Cash awards, to be called the "Dolly Gray" award, are to be set up. Two purposes would be accomplished by this contest: it would awaken interest in ready-mixed concrete among student engineers and it might provide information of value written in some of the entries.

A warm tribute was given Clarence C. Deal, who during the meeting was presented with an honorary mem-ber-ship certificate. Charles P. O'Leary made the presentation.

The association secretary, R. E. Hutchins, read his annual report, in which he covered the accomplishments of the recent concrete short course in some detail. This association under-taking was held last December at the University of Illinois. The program was aimed at dispatchers and sales-men, as well as their bosses, he said. More round table type discussions should be held, and more information of interest to office personnel should be offered at the next short course, Mr. Hutchins suggested.

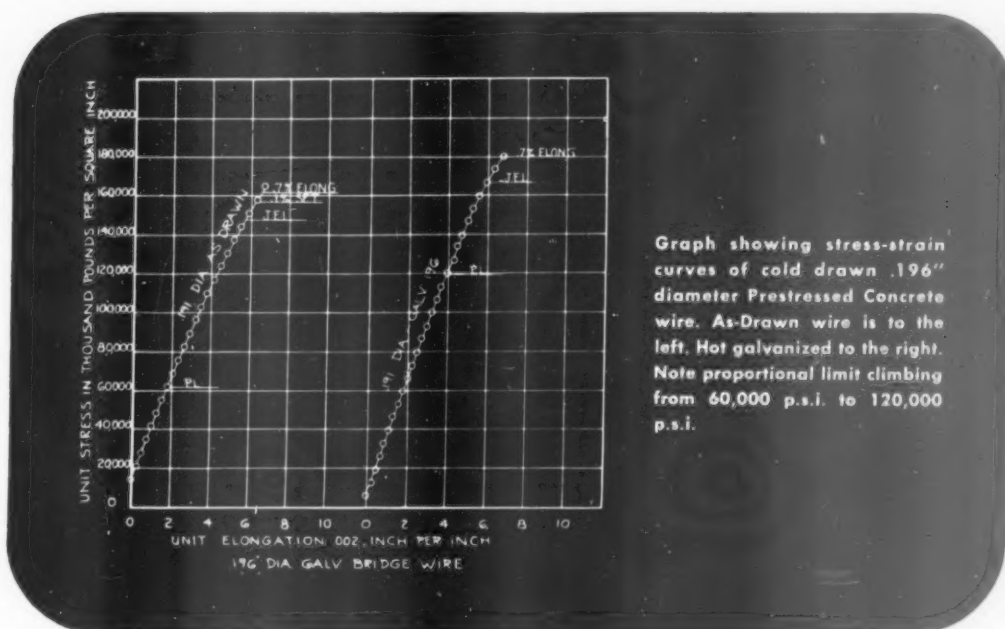
#### Officers

Officers of the new Midwest Ready Mixed Concrete Association were elected at the meeting. Taking office as the first president under the new name was Ernest Horne, Ready Mixed Concrete Corp., Indianapolis, Ind. R. J. Hummel, Consumers Co., Chicago, is vice-president, and treasurer is D. C. Hay, Kuert Concrete Inc., South Bend, Ind. Members of the board of directors, in addition to these officers, include Miss Harriet Bell, Zimmerly Construction Co., Paris, Ill.; Wendell L. Covalt, Kokomo Ready Mixed Concrete Co., Kokomo, Ind.; and Andrew F. Bieker, Bieker Co., Hammond, Ind.

Directors elected last year and con-tinuing in office are L. L. Shidler, Triangle Construction Co., Kankakee, Ill.; Donald L. Moritz, C-J Ready Mixed Concrete, Effingham, Ill.; and John H. Rudolph, Concrete Supply Co., Evansville, Ind.

A banquet and floor show was part of the entertainment offered during the convention.

# PRESTRESSED CONCRETE



Graph showing stress-strain curves of cold drawn .196" diameter Prestressed Concrete wire. As-Drawn wire is to the left. Hot galvanized to the right. Note proportional limit climbing from 60,000 p.s.i. to 120,000 p.s.i.

## Why you should use hot-dipped galvanizing

SURFACE PROTECTION is *not* the chief reason to specify hot-dipped galvanizing on your post-tensioned Prestressed Concrete projects. It's true that this method gives the best protective coating against corrosion. More important, however, hot-dip galvanizing of the acid steel relieves the wires and raises their elastic properties considerably above those of cold drawn wire.

This wire permits the use of design-tension stress of 120,000 p.s.i. Used at this value, you are always working in the elastic range of the wire itself. And we can guarantee absolute stability with no relaxation of the steel... your assurance of safety for the life of the structure.

Each length of Roebling Prestressed Concrete Strand is made into an assembly at the factory with the use of specially designed fittings. Each fitting develops the full breaking strength of the strand without exceeding the yield point of the material in any part of the fitting. Each assembly is then proofloaded in excess of the recommended design-tension stress.

At the construction site the use of an inexpensive hydraulic ram brings the strand assemblies to stress in min-

utes, cutting the on-the-job labor costs to a minimum. And you never need worry about costly take-ups either.

Strand for post-tensioning is just one of a full line of Roebling Prestressed Concrete products. Wire and strand for *pre-tensioning* are made of high tensile acid steel that results in exceptionally high elastic characteristics. They are specially treated to greatly increase their bonding quality, too.

We manufacture our own prestressing materials. We know they will deliver all we promise and more. Get the facts and figures on Roebling Prestressing materials. Write Prestressed Concrete Department, John A. Roebling's Sons Company, Trenton 2, New Jersey.



Roebling Prestressed Concrete Strand and its specially developed fitting which are available in a complete range of sizes from  $\frac{3}{8}$ " to  $1\frac{9}{16}$ ". With an inexpensive hydraulic ram, assemblies such as these can be brought to stress in a matter of minutes.

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Here you have a choice of 18 shades—6 Reds, 3 Greens, 3 Browns, 3 Yellows, 1 Black, 1 Blue, and 1 Orange. Each shade is manufactured to meet the most exacting specifications for cement work—as recommended by the American Concrete Institute and the Portland Cement Association.

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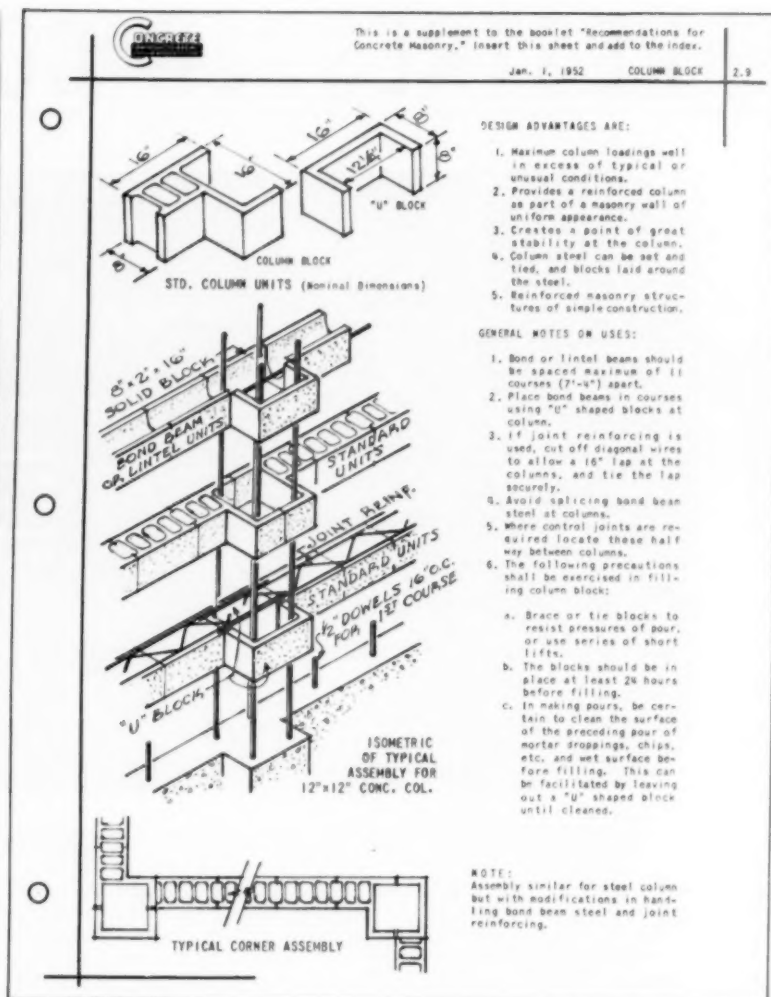


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Supplement to the Concrete Products Association of Washington booklet, "Recommendations for Concrete Masonry," gives design advantages and general information on the assembly and use of concrete column block

### Concrete Masonry Column Block

CONCRETE PRODUCTS ASSOCIATION OF Washington recently issued the first supplement to its booklet "Recommendations for Concrete Masonry." The supplement (see illustration) shows the assembly and use of concrete column block.

The column block unit combines the virtues of both reinforced concrete and concrete masonry. Heavy column loadings, simplified construction and increased masonry stability are a few of the advantages claimed for this type of construction. The block can also be used with steel columns and provides fireproofing cover for them. Comments from masons and contractors indicate satisfaction with these units.

### Plastic Liner for Pipe

A LARGE VINYL plastic-lined, reinforced concrete pipeline nearly 7 miles long and over 2 yd. in diameter is

being installed in Orange county, Calif. The reinforced concrete pipe is lined with "T-Lock Amer-Plate," a plastic sheeting developed and manufactured by Amercoat Corp., South Gate, Calif.

The plastic sheets, approximately 4 x 8 ft. and not less than 0.060 in. thick, are softened and welded into one continuous lining. The sheeting, made from Geon polyvinyl chloride resins produced by B. F. Goodrich Chemical Co., Cleveland, Ohio, and inert pigments and plasticizers, protects the concrete pipe against disintegration from gases in the sewage.

The pipe used for the Orange county sewer project is being lined only three-quarters of the way around, inasmuch as the gas area above the water is the only portion of the pipe which requires full protection. Consisting of 78-, 48- and 39-in. pipe, the 35,000 lin. ft. of reinforced concrete pipe used for the project is lined with approximately 400,000 sq. ft. of the plastic sheets.

When concrete is placed for pipe or



structure, the tees, or ridges, on the back of the plastic sheets are imbedded and locked into the concrete and thus form an integral part of the end product. Being thermoplastic, the sheets are then fused together by a hot air torch to form a strong union between the joints.

In addition to pipe, the plastic lining is applicable to manholes, underground gauging chambers, distribution chambers, or as a lining for concrete tanks which are subject to corrosive acids and alkalis.

### Sales Supervisor

NORMAN D. NICHOLS has been appointed field sales supervisor for A. C. Horn Co., Inc., Long Island City, N.Y., subsidiary of Sun Chemical Corp. Mr. Nichols, a graduate civil engineer, has specialized in the production of concrete and concrete products for industrial and home use. At one time he was resident construction engineer with the Portland Cement Association. More recently, Mr. Nichols' experience



Norman D. Nichols

involved the manufacture of precast concrete wall panels utilizing air entrainment. As field sales supervisor for A. C. Horn Co., he will promote Ayr-Trap, an air-entraining agent for concrete and for cement mortars. He will also assist the sales staff, acting as a consultant and technical adviser in the building unit field.

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IN EVERY CHANNEL OF OPERATION!**

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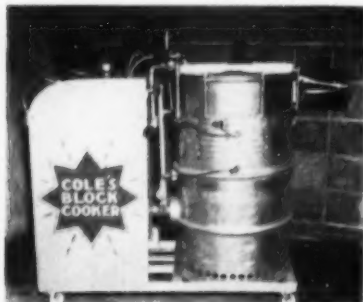
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# NEW MACHINERY

## Block Curing Unit

A. J. COLE Co., P. O. Box 446, Chillicothe, Mo., has introduced its space heater and block curing unit. The



Block space heater

former is a portable heating unit with a horizontal blower mounted on top, which delivers a continuous blast of heated air through an 8-in. outlet. It is a direct-fired unit, requiring no stack, but when used in a tight room ventilation is necessary. The block heater is for use in a small plant, and, it is said, will furnish the heat required to cure 500 block in 4-6 hr. or 1000 block in 6-8 hr., depending on outside temperature and the efficiency of the kiln, at a cost of less than ¼ cent per block. Without water, the unit becomes a space heater.

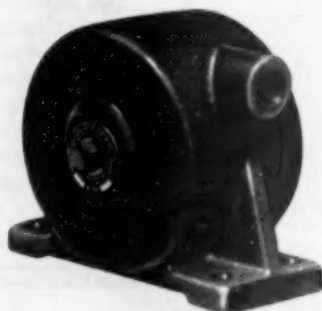
## Moisture Tester

ALPHA-LUX Co., Inc., 2767 Gaul St., Philadelphia 34, Penn., has been named distributor for an English device used to determine water content of sand. The "Speedy Moisture Tester" is a meter which measures from zero to 20 percent moisture and uses a reagent which appears to be calcium carbide.

A sample of moist sand, weighing approximately 6 grams, is placed in the top cup of the tester. A measured volume of reagent is placed in the other cup and the two clamped together and mixed by vigorous shaking. The gas pressure resulting from the moisture in the sand and the calcium carbide is measured on an attached pressure gauge calibrated to give direct readings of the moisture content of the sand sample. It is said that this entire procedure can be made in 40 seconds.

## Large Vibrator

MARTIN ENGINEERING Co., Kewanee, Ill., has added a larger vibrator to its patented Peterson "Vibrator" line. The new model, designated DV 51, has a 2-in. ball that weighs 1 lb. and is pneumatically driven around a stationary hardened and finish-ground



Self-starting vibrator

two rail race. It is reported that the DV 51 is instantly self-starting, requires no lubrication and gives a powerful all-directional vibration.



Excavator with hoe attachment

## Hoe Attachment

KOEHRLING Co., Milwaukee 16, Wis., has designed a hoe attachment for its 304 excavator which, according to the manufacturer, will increase the machine's digging depth to 19 ft. 9 in. Rated as a ¾-cu. yd. excavator, the machine's dipper arm is pivoted at the end of the boom and jackknives to dig a vertical backwall. This is said to reduce hand cleanup time to a minimum. It is also claimed that use of double digging lines to the dipper eliminates reverse cable bends and results in savings due to longer cable life.

## Invisible Waterproofing

THE DASCO Co., INC., 1602-04 Thames Ave., Baltimore 31, Md., has developed a transparent liquid product claimed to withstand hurricane-driven rain and water years after application. This colorless product, known as Dashide, can be brushed or sprayed on concrete, stucco, or glass-brick walls; penetrates ¼-1 in. into the wall surface, depending upon the porosity; and is said to have no effect upon the outward appearance of the treated wall. The company reports that the liquid is completely resistant to acids, alkalies and temperature extremes without checking, cracking or peeling.

## Extends Truck Line

THE WHITE MOTOR Co., Cleveland 1, Ohio, has announced that a new application of its Model 3000 truck with 3½-cu. yd. concrete mixer is said to afford a weight distribution advantage and to permit an additional ½-cu. yd. payload of mix within highway weight limitations. Weight distribution on the truck with 3½ cu. yd. of mix and 125 gal. of water are: front axle—7500 lb.; rear axle—19,950 lb.; and total G.V.W.—27,450 lb. Shown in the accompanying photograph is the Model 3020 single axle unit with 109½-in. wheelbase, and equipped with 3½-cu. yd. Challenge mixer.



Truck with 3½-cu. yd. concrete mixer

# the payload champion Jaeger "Mix Plus"

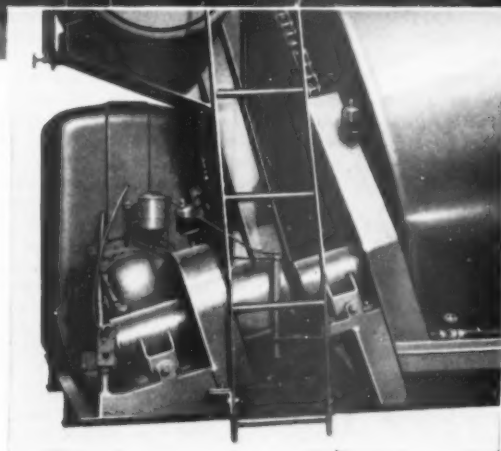
3 YARD, 4990 Lbs. 4½ YARD, 6400 Lbs. 6½ YARD, 7200 Lbs.



## Improved end loader designs

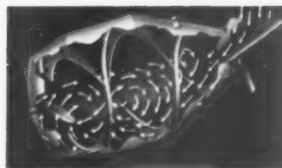
The only open-type end loader with instant-opening gate that prevents cement blow-back and water spillage and gives complete control of load.

Perfect seal end loader is furnished for wet-mix plants and special dry-batch requirements.



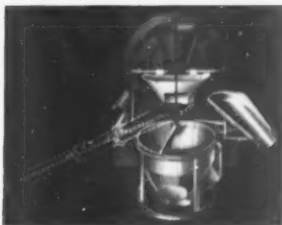
## Revolutionary "Comatic" hydraulic power transmission gives fingertip control of drum

Hydraulic power does all the work — one touch of a lever starts or stops drum, or disengages, brakes and engages in one automatic cycle when reversing. No shock possible. Specifically designed for truck mixer service. Far superior in safety, simplicity and low maintenance to finest multiple clutch transmissions. Available with either separate engine or power take-off adapter for truck engine drive.



## Jaeger "dual mix" drum:

Fastest to charge, mix and discharge, and built for the 8 to 10 years' service you expect from Jaeger. No sacrifice of long-proven design or heavy duty construction.



## "Swing Away" 3-piece

chute: Chute head instantly swings to side for direct bucket discharge. Chute head and quick-coupling sections give operator his choice of 5', 8', 10' and 13' lengths adaptable to any discharge condition.

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Precast wall panels are set in place by crane

## Precast Concrete Wall Panels

THE MARIETTA CONCRETE CORP., Marietta, Ohio, is producing precast concrete wall panels for the new plant of Union Carbide & Carbon Corp.'s Electro-Metallurgical Division near Marietta. Several buildings in this \$100,000,000 plant expansion program have already been completed. The original one was a steam power station in which about 60,000 sq. ft. of insulated, precast concrete wall panels were used. As a result of the satisfactory experience with this structure, additional contracts were then awarded to The Marietta Corp. for 500,000 sq. ft. of panels for use in other buildings in the program.

The panels, which were developed as non-loadbearing walls, are produced by Marietta in two basic nominal sizes—8 x 8 ft. and 8 x 10 ft., with special sizes as required. They are cast in steel forms with a tolerance in dimensions and warping of plus or minus  $\frac{1}{8}$  in. The panels are 5 in. thick and are of laminated construction in which  $1\frac{1}{2}$  in. of rigid insulation separates interior and exterior layers of concrete, each  $1\frac{1}{4}$  in. thick. The panels are made square, or nearly square, to equalize shrinkage in both directions.

The concrete is required to have

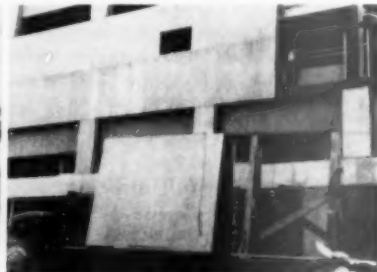
a minimum strength of 4000 p.s.i. in 28 days, and an air-entraining agent, added at the mixer, must produce a concrete having at least  $3\frac{1}{2}$  percent and not more than  $4\frac{1}{2}$  percent of entrained air. The concrete has a slump between  $2\frac{1}{2}$ - $3\frac{1}{2}$  in. and is made with high early strength cements (6 bags per cu. yd.) and  $\frac{3}{4}$ -in. maximum-sized aggregate. In 7-day tests, results have averaged 4300 p.s.i., so few 28-day tests have been required.

The panels are cast with a 4- x 4-in. No. 10 wire mesh imbedded in each layer of concrete. About 35 panels, or approximately 2500 sq. ft. of wall area, are erected in an average day. The panels are adapted to roofing requirements. Most of the panels have tongue-and-groove joints.

A new \$150,000 plant, designed specifically for the production of precast wall panels, was recently completed by the Marietta firm and is now turning out 2500 sq. ft. per day. Production and erection of the panels has been under the supervision of R. Neil Christy, executive engineer of the company. Robert C. Stelzle was recently appointed production head of the new fabricating plant. Engineer Henning de Bang, representing the customer, is acting supervisor and inspector for the fabrication and further handling of the wall panels in the field, including erection, caulking and final approval.



Left: Precast panels are hoisted by crane onto special frames on truck. Right: Panels are delivered by truck directly to building site





## Stacked Concrete Masonry Construction

NATIONAL CONCRETE MASONRY ASSOCIATION, in Technical Report No. 37, discusses special requirements for walls built of concrete masonry units laid in stacked bond. The report was prepared in response to architects, engineers, code organizations, etc., who have requested advice and recommendations on problems confronted in connection with stacked concrete masonry construction.

N.C.M.A. advises that stacked concrete masonry, laid with continuous vertical joints, may be used in load-bearing and non-loadbearing walls under the same provisions, requirements and working stresses applicable to concrete masonry of ordinary running bond construction with the following additional requirements and limitations:

1. Loadbearing walls and exterior walls shall be laid with Type B or stronger mortar (A.S.T.M.: C 270-51 T) and shall be reinforced longitudinally as specified in one of the following alternatives:

a. Two reinforced concrete masonry bond beams per story height of 12 ft. or less, the upper such beam to be continuous and located at or near the top of the wall or intermediate lintel or floor level, and the lower such to be located near mid-height of

the wall. The lower bond beam may extend intermittently at two levels if necessary to pass under window openings. Bond beams to be reinforced with two bars, not less than  $\frac{3}{4}$  in. round in size, properly positioned to resist lateral bending inwardly and outwardly. Concrete used in filling hollow spaces of masonry bond beams to be of at least 2500 p.s.i. compressive strength.

b. For each story height of 12 ft. or less, one continuous upper level bond beam as described above (a), plus two  $\frac{1}{4}$ -in. round bars or prefabricated reinforcement having two No. 6-gauge longitudinal wires, placed in every third horizontal mortar joint or 24-in. vertical spacing between reinforced joints. The two longitudinal bars or wires of such joint reinforcement shall be secured the proper distance apart with approved metal ties and shall be embedded in the face shell mortar beds along their entire length. Such reinforcement shall be lapped not less than 32 bar or wire diameters at splices unless a shorter lap, justifiable from test data, is approved by the building official.

c. Joint reinforcement of  $\frac{1}{4}$ -in. rods or No. 6-gauge wire, as described above, placed in alternate mortar joints or 16 in. between reinforced mortar joints.

2. Where concrete floor slab construction is present, the edge of which bears 4 in. or more on the wall and

is properly reinforced and structurally continuous, such construction may be considered as taking the place of the bond beam at this level.

3. The amount of reinforcement specified in No. 1 may be reduced by 30 percent for loadbearing stacked bond concrete masonry back-up which is bonded with masonry bonders to masonry facing laid in running bond. However, the maximum allowable vertical spacing between reinforcing levels may not be increased.

4. Non-loadbearing partitions shall be reinforced longitudinally with embedded joint reinforcement at vertical spacings not exceeding 32 in. Such reinforcing shall consist of hardware cloth or two No. 9-gauge steel wires or equivalent.

5. Where vertical cell units are laid with cells horizontal, using A.S.T.M. Type B or stronger mortar, the allowable working stress in compression shall not exceed 60 p.s.i. on the gross cross section in bearing, nor more than 10 percent of the strength of the unit tested in a position such that the load is applied in the same direction as in service.

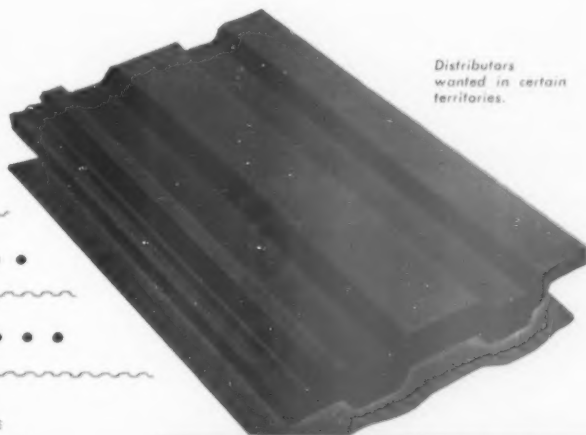
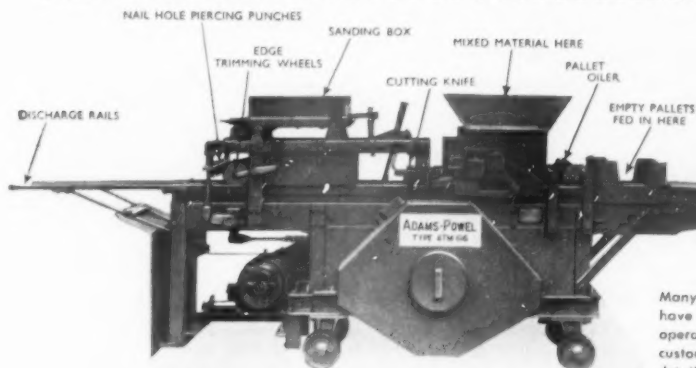
6. Concerning stacked bond construction which may be subject to seismic shock or winds of hurricane velocity, consideration should be given to such additional requirements and restrictions as may be consistent with local experience and engineering practice.

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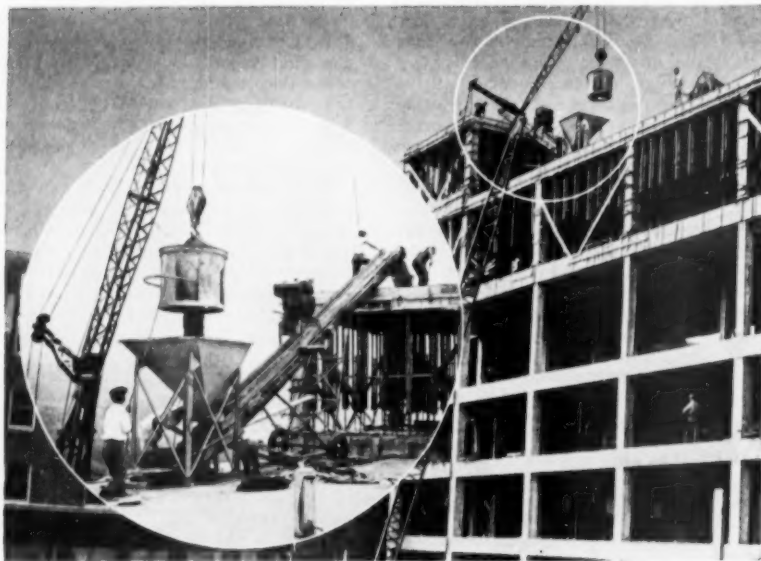
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## Concrete Pipe Meeting

THE WESTERN CONCRETE PIPE ASSOCIATION held its 33rd annual convention in Fresno, Calif., March 26-28, 1952. The meeting, which drew an attendance of over 100 members from the states of Arizona, California, Idaho, Montana, Nevada, New Mexico, Oregon, Texas, Utah and Washington, was said to be one of the most interesting ever held.

Among actions taken at the meeting were endorsement of a program to cooperate with agricultural colleges of the West through mutually beneficial research projects and supplying literature to students at these schools. Also endorsed was the preparation of a specification for installation of concrete sewer pipe.

Guest speakers at the meeting included A. F. Pillsbury, associate professor of irrigation, University of California, Los Angeles, who spoke on "Concrete Irrigation Pipe Investigations," and P. H. McGaukey, deputy director of the University of California's sanitary engineering research project at Richmond, Calif., who spoke on "Concrete Pipe in Sanitary Sewer Design."

Howard F. Peckworth, managing director of the American Concrete Pipe Association, discussed his trip to Ireland last year (at the request of the Irish government to advise them on the use of drain tile), and reported on the condition of the industry on the national level.

E. C. Fortier, design engineer, U.S. Bureau of Reclamation, presented a motion picture, "Water in the West," produced in color by the bureau.

H. W. Chutter, Jourdan Concrete Pipe Co., Fresno, Calif., was re-elected president of the association for 1952. Also re-elected were Fred N. Linn, United Concrete Pipe Corp., Modesto, Calif., vice-president; and William S. Rogers, Rogers Materials Co., Madera, Calif., secretary-treasurer. Four members of the board of directors were elected for a three-year term, these being H. W. Chutter; William H. Hurst, Hurst Concrete Products, Santa Barbara, Calif.; and H. B. Tellyer, Tellyer Concrete Pipe Co., Albuquerque, N.M., who were re-elected, and a new director, Ward Hughes, Concrete Conduit Co., Colton, Calif.

## TV Advertising

UNIVERSAL CONCRETE PIPE Co., Columbus, Ohio, has scheduled another TV program as an advertising medium for promoting the sales of concrete block and sewer pipe. The company is sponsoring a 15-min. news broadcast by Jud Collins, twice weekly, at 10:00 p.m., over WSM-TV, Nashville, Tenn.

Joseph M. Millious, Universal's advertising manager, stated, "We are convinced that television is an ideal medium for building a consumer franchise. Our problem at Nashville is to let the entire area know our local (Nashville) plant has started manu-



Joseph M. Millious, Universal's advertising manager, inaugurates TV program

facture of small-size concrete pipe, and to focus consumer demand on local Universal dealers. We also want to sell more concrete block which is a highly competitive item. Our TV shows should do a combination product merchandising-institutional selling job that will make people think of Universal when they need these products."

Program viewers will be offered sets of architectural plans for farm building construction as a means of stimulating block sales and to test response to the telecasts.

### Corncob Concrete

GOVERNMENT CONSTRUCTION engineers, working with Michigan State College Agriculture Department engineers, have been experimenting in the use of corncocks as a substitute for gravel for the production of a lightweight concrete with good insulating qualities, suitable for farm use. According to recent reports, the engineers have met a degree of success in using corncob pellets about  $\frac{3}{4}$  in. in diameter. The department reports that a wall and floor slab of corncob concrete have been exposed to weathering for 15 months, including two winters, with no apparent bad effect.

The department is not yet ready to recommend the use of corncocks in concrete, but plans to do further research on the subject. It was stated that cored block using cob pellets so far have proved difficult to make and use, and from the standpoint of safe building strength, the volume of cob pellets could not be more than three times the volume of cement. The engineers also found it necessary to soak the pellets in water for five or six hours before using them in concrete mix; otherwise, they absorb moisture from the mix and cause the concrete to crack while setting.

Another experiment being conducted by the department engineers is the substitution of air for sand in concrete to produce a lightweight ma-

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Although anyone can assemble some form of truck mixer, the ready mixed industry built its quality acceptance by standardizing on truck mixers and agitators of approved design, certified by Rating Plate. Insistence on this Rating Plate preserves these standards and safeguards your share of a business that exceeds \$500,000,000 a year.

(Advertisement below is being read by your best customers in Architectural Record, Engineering News Record, Western Construction and Southwest Builder.)



New Orleans parking garage, built in 30 units, cost only \$400 per car space. Unit is a 32' slab cantilevered on columns spaced 16'. Overlapped cantilevers between units span 32', make space for another car. In cross section slabs are 66"3",

columns spaced 20'. Hinging columns at base eliminated bending moment, allowed tapering to gain space. Slab thickness averages only 7 1/2", with only 5 lbs. of reinforcing steel per sq. ft. of slab.

## A car for every 200 sq. ft. — all within 3 minutes of the street

Designed to provide quick-access parking for as many cars as possible within its site dimensions, this garage was built at extremely low cost in a series of 30 independent units, each a flat slab cantilevered on tapered columns hinged at their base, with overlapped cantilevers doubling the span between units.

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You have a right to insist on this Rating Plate on any truck mixer that serves your jobs. It is available to all who comply with the quality standards established by the National Ready Mixed Concrete Association and the Truck Mixer Manufacturers Bureau.

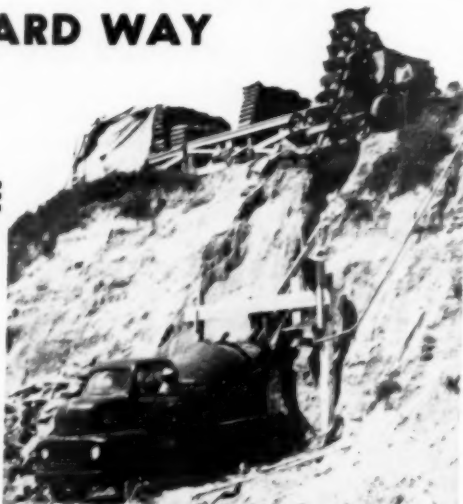
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## THE WILLARD WAY FOR OILFIELD CONCRETE



A Willard "Spread" consisting of Weigh Batch Loader and Truck Mixers handles batching, mixing, hauling and pouring concrete for mats and foundations in this booming oil field.

Move with the field on Willard wheels — the right mix at the right place at the right time and at the right cost.

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### Willard Concrete Machinery Sales Company

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terial. Air is blown into the cement, water and gravel during mixing. Test results have shown that air-gravel concrete is strong enough for floors or lightly loaded walls. It averaged 30 lb. less in weight per cu. ft., provided about twice as much insulation as ordinary concrete, and absorbed less moisture, according to the report. It was further stated that freezing and thawing tests that brought ordinary concrete almost to the point of failure, actually improved the structure of the air-gravel concrete. Its success was said to depend primarily on development of a method of controlling the air content.

### Opens Ready-Mix Plant

ROY J. CAMPBELL & SON, Arvada, Colo., recently opened a ready-mixed concrete plant in Arvada. The product will be known as Suburban Reddi-Mix Concrete.

### Concrete Fact Book

AUTOLENE LUBRICANTS Co., Denver, Colo., has published a new and enlarged edition of the "Protex Modern Placement of Concrete" fact book, containing technical information and field use tips on air-entrained concrete. It is in the form of questions and answers and contains many photographs of recent concrete construction projects. Copies of the new edition are available by writing to Autolene Lubricants Co.

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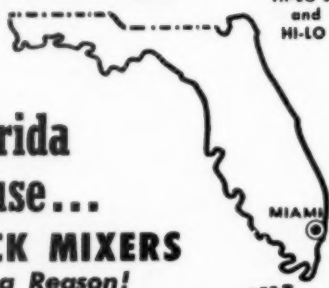
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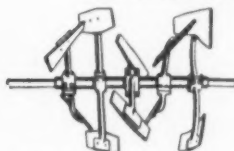
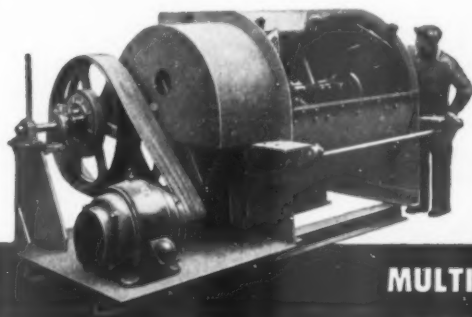


## MULTI-BLADE MIXERS

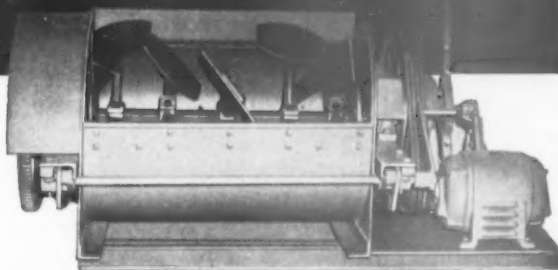
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"Super Action" blade arrangement gives these "super" results! Unlike the two conventional spiral blades, which push the mix one way along their entire length, Multiplex' ten paddle shaped blades push the mix in opposing directions. This cutting, turning, and kneading produces thorough mixing in shorter time, at less cost. Liner wear is reduced, as the mix is churned against itself.

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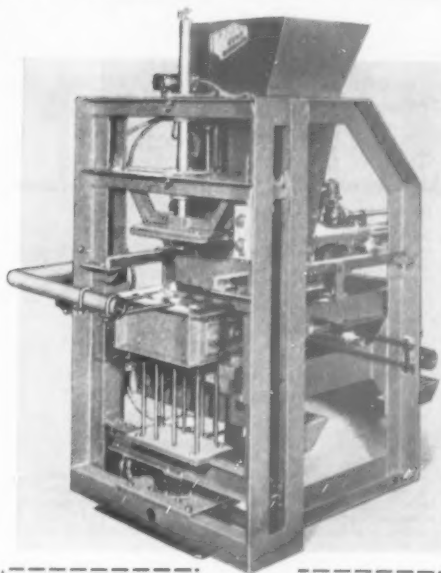
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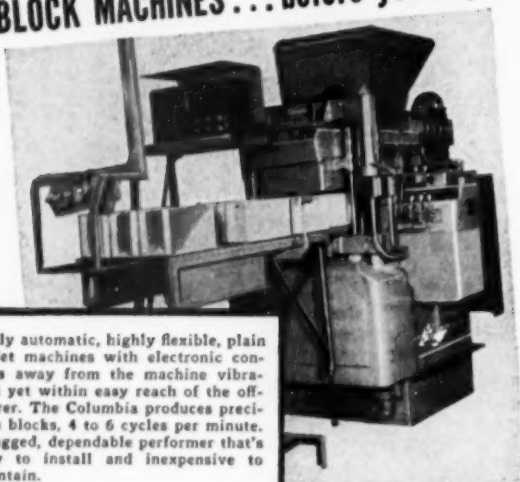
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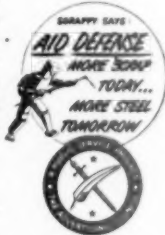
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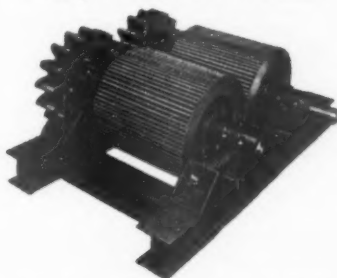
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278 Chestnut Street, Liberty, N.Y.—Phone 357

# PRICES CUT

## CRUSHERS-SCREENS-CONVEYORS CONVEYOR PARTS-SCALES-FEEDERS

Guaranteed Equipment — Immediate Shipment

### CINDER, PUMICE, PERLITE CRUSHERS



10 to 20 tons per hour capacity \$ 479.00  
25 to 50 tons per hour capacity 1144.00  
50 to 100 tons per hour capacity 1483.00  
Complete with hoppers.

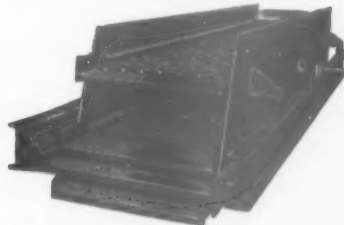
### PAN AND RECIPROCATING FEEDERS

Complete with motor and drive. 15 to 225 tons per hour capacity.  
Priced from ..... \$423.00

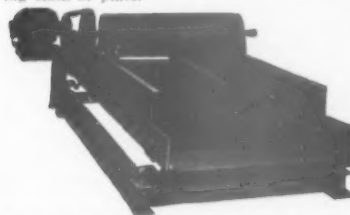
### TRUCK SCALES

20 Ton Truck Scales ..... \$617.00  
26 Ton Truck Scales ..... 684.00  
33 Ton Truck Scales ..... 985.00  
Others to 50 ton capacity. All scales complete with structural steel. Parts and weighing beams for most makes of motor truck scales.

### VIBRATING SCREENS

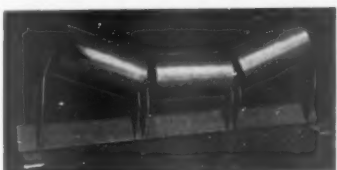


Heavy duty eccentric shaft types. 1 to 5 decks; screen sizes to 5x14. 4 double-roll, self aligning sealed bearings. Priced from \$1573.00 including cloth or plate.



Eccentric weight type screens, 1 to 3 decks; sizes to 3' x 8'. Including cloth or plates, from \$479.00.

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3-roll Troughing Idlers for these sizes:  
14" belt .....\$22.00 24" belt .....\$25.00  
16" belt ..... 23.00 30" belt ..... 26.00  
18" belt ..... 24.00 36" belt ..... 27.00  
42" belt ..... \$28.00  
1-roll Return Idlers for these sizes:  
24" belt .....\$10.00 36" belt .....\$11.50  
30" belt ..... 11.00 42" belt ..... 12.50  
48" belt .....\$13.50

All steel. Interchangeable with other well-known makes. Replaceable ball bearings. No bearing adjustments required. Easy to start and will run in cold weather. Rust-proof ball races; maintenance is negligible.

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Any length. Flights up to 8" x 24". All welded structural and sheet steel. Heavy duty, double guided chain.  
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Flat belt, troughing, and flight models. Tell us your needs.

## A.C. & D.C. MOTORS — DRIVES — CONVEYOR BELTING — CHAIN — SPEED REDUCERS — BEARINGS

WE HAVE MACHINERY FOR LIGHT-WEIGHT AGGREGATE, EXPANDED CLAY, AND PLANTS PROCESSING VOLCANIC AND OTHER NATURAL CINDERS.

More than 3500 mines and quarries have modernized with Bonded equipment.

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ROCK PRODUCTS' GENERAL SECTION

# CLASSIFIED ADVERTISEMENTS

## MODERN BLOCK PLANT FOR SALE

Over 40 years in business, located in central Michigan, equipment consists of new 2 block machine, 30' mixer directly above machine, Butler overhead bins, bulk cement, weighing batcher, lift trucks, two 4 wheel trailers, masonry saw, welders, etc. Concrete storage yards, new modern office, factory buildings, warehouse. This business could not be duplicated for less than \$250,000. Asking price \$145,000, plus inventory at time of sale. Wife's health necessitates moving south. If you are just curious please don't bother me. If you are honestly interested in a good sound profitable business I will be pleased to send you pertinent information. Terms can be arranged. Write BOX K-61, CONCRETE PRODUCTS 309 West Jackson Blvd., Chicago, Illinois

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Excellent LIGHT-WEIGHT FINE AGGREGATE to extend other light-weight aggregates that are in short supply.

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## BULK-CEMENT BINS

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## WEIGH-BATCHING EQUIPMENT

## CEMENT-AGGREGATE ELEVATORS

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2 Cu. Yd. Rex horizontal mixer on Ford truck. Good condition. In daily use.

3 Cu. Yd. Ransome HiUp, mixer only, new rear door. Mixer in good condition, Hercules engine.

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1 — #2 Kent Continuous Mixer, Purchased June 22, 1951. Like new.

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1—used 3 yd. Dumperette complete with hoist, chutes and body.

Bought new in 1946 for approximately \$2000.00 Will sell for \$1000.00

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Both McCracken Type and Martin Travelers—PROVED to last as long or longer — yet cost considerably less. Write for prices.

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Portable Crushing & Wash Gravel Plant 10" x 24" Pioneer Crusher with scalping screen—Feed Hopper & Pioneer Feeder, 80 ft. delivery conveyor to crusher, 40 ft. Columbus Bucket Elevator from crusher to scrubber, Cedar Rapids Scrubber & Triple Deck Screen with 4 all-steel bins and sand drag. This is an all electric plant with gear head motors. Produces 80 to 100 tons per hour of crusher run material or 5 sizes of washed gravel at one time. Lots of spare screens and parts. Bargain. Price complete \$27,500.00. Reason for selling—deposit exhausted. Miller Bros. Contractors, R. R. #21, West Milton, Ohio, Phone 724-W.

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## UNBREAKABLE PALLET RINGS

Write for full information

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A car load or a train load. Our supply is unlimited. Processed ready to use. Locations on Baltimore & Ohio, Pennsylvania, Lehigh Valley, and Reading Railroads. Call or write

R. P. McMINDES COMPANY

P. O. Box 32 Ashland, Penna.

Phone: 367

## FOR SALE

Fleming 180 Automatic Block Machine with 4" and 8" boxes and spare parts. Kent #4 Continuous Mixer, good as new.

KANSAS COAL & MATERIAL CO.

729 W. 2nd. Wichita, Kansas

## FOR SALE

One Towmotor Fork Lift Truck, 5,000 lbs. capacity equipped with six (6) forks for handling concrete blocks. Priced reasonably. Can be seen in operation at Harrisburg Building Units Co., Inc., 1500 N. Cameron St., Harrisburg, Pa. Phone 4-1174.

## WANTED

Two Besser Super Vibrapacs. Give age, attachments and price. Write Box K-68, CONCRETE PRODUCTS, 309 West Jackson Blvd., Chicago 6, Illinois.

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45—3 deck steel racks, with wood stickers. ....\$10.00 ea.  
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W. N. HALL & SON, Allegany, New York

## FOR SALE

16 x 20 Chimney Block machine with 92 cast iron pallets. Also 1200 cast pallets for 42 x 48 manhole blocks.

FORTRESS CONCRETE PRODUCTS

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1 Stearns #7—complete with extra attachments.

3500 8" Pallets

45 Steel Racks—64 Block capacity

1 28 ft. Mixer

This equipment is two years old and in good condition.

For further information, contact

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One Spider for 7½ Austin Crusher, new condition. One new Bushing in factory crate.

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WOOTEN D-4 DRAIN TILE MACHINE WITH 5 H.P. SINGLE PHASE MOTOR—GOOD CONDITION.

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P.O. Box 306 Ormond, Fla.

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One Kelly Concrete Block Machine complete with mold boxes for 8x8x16", 8x12x16", 8x4x16", 2000 8x8x16" Steel Pallets, 800 8x12x16", 700 8x4x16". ALL IN EXCELLENT CONDITION. Phone Albany, New York, 42541.

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Brand New Pallets (Pressed Steel)  
2000—9½ x 15½—Code "Cape"  
150—9½ x 15½—Single Corner Code "Carp"  
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The Whole Lot for \$1,000.00

EINFELDT CONCRETE PRODUCTS

1926—12th Avenue Moline, Ill.

KEEP ABREAST  
WITH  
INDUSTRY TRENDS  
THROUGH  
ROCK PRODUCTS



# CLASSIFIED ADVERTISEMENTS

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Cement and Pumice Plant, F.H.A. approved blocks, running full capacity. See "Ever-tru" Moses Lake, Wash., location of plant, (In the heart of Columbia Valley Project) or contact: Bylisma & Pepper, Bellingham, Washington.

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One Clark Lift Truck, Model "Carloader," Capacity 4,000 pounds, Serial No. CL-46-437, Good Condition, Extra Set new tires and spare carburetor goes with truck. A Good Buy—Reasonable price. Call or write owner, General Dredging Company, Inc., MASOLITE DIVISION, 2200 La Fontaine Street, Fort Wayne, Indiana. Phone Anthony 1453

## CONCRETE BRICK COLORS CEMENT COLORS MORTAR COLORS

made by  
**BLUE RIDGE TALC CO., INC.**  
Henry, Virginia

## FOR SALE

4—2 cubic yard, high discharge Jaeger Mixers, Model 2HC, powered by Hercules gas engine.

**TRIANGLE CONSTRUCTION CO.**  
480 North Evergreen Ave. Kankakee, Ill.

## NOTE

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**CONCRETE PRODUCTS**  
309 West Jackson Blvd., Chicago 6, Ill.

## FOR SALE

2 Stearns #9 Jolt Cretes  
100 Steel racks  
3000 12" pressed steel pallets 45%  
airspace  
5000 8" pressed steel pallets 45%  
airspace  
4000 6" pressed steel pallets  
4000 4" pressed steel pallets  
1-12" mold box 2 off-bearers  
2-8" mold box 2 turntables  
1-6" mold box 2 pallet oilers  
1-4" mold box 1 hand lift  
truck

**BOX K-65, ROCK PRODUCTS**  
309 West Jackson Blvd., Chicago 6, Ill.

## COMPLETE EQUIPMENT FOR SMALL CONCRETE BLOCK PLANT

Block Machine, Concrete Mixer, Conveyor, Racks, Pallets, Etc. All good condition. Replacement Cost, \$2300.00. Selling price, \$1100.00. Will Sell all or part.

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## STOP that WATER

With FORMULA NO. 640  
A clear liquid—7 different resins in a solvent which penetrates 1" or more into concrete, concrete blocks, stucco; seals, holds 1250 psi water pressure. Applies quickly—no mixing—no furring—no membranes—no cleanup. Use on forms—wood or concrete.  
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**WOLF R/M CONCRETE COMPANY**  
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Hoists • Compressors • Transformers  
Units of Every Size and Description  
WE'LL SELL, BUY OR TRADE



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2-four yard Jaeger truck mixers (Horizontal), good buy, considering good condition and low price, operating daily.

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Write for free samples and prices of "LANSCO" CEMENT COLORS produced in 34 attractive shades. Packed in bulk and in 1 lb. and 5 lb. packages.  
manufactured by

**LANDERS-SEGAL COLOR CO.**

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Zeidler Drain Tile Machine. Full equipment for 5" thru 10" tile. Motor included and power feeder. Electric controls. Just rebuilt. Also 12 Cu. Ft. Stearns mixer.

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Here is the quick way to get information and prices on machinery and equipment. Just check the item (or items) listed below about which you desire information. Then send this list to us, and we will take care of the rest.



TEAR OFF HERE



— Admixtures, Aggregate  
— Aftercoolers, Air  
— Aggregates (special)  
— Air Compressors  
— Air Separators  
— Asphalt Mixing Plants  
— Bagging Machines  
— Bags  
— Barges  
— Batching  
— Belting, Conveyor,  
— Elevator, Power  
— Transmission  
— Belting, V-Type  
— Belt Repair Equipment  
— Bin Level Indicators  
— Bins and Batching  
— Equipment  
— Blasting Supplies  
— Block Machines  
— Concrete Building  
— Bodies, Trailer  
— Brick Machines, and  
— Molds  
— Buckets  
— Bulldozers  
— Cars, Industrial

— Classifiers  
— Clutches  
— Coal Pulverizing  
— Equipment  
— Concentrating Tables  
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— Plants  
— Concrete Specialty  
— Molds  
— Concrete Waterproofing  
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— Dewatering Equip-  
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— Dragline Cableway  
— Excavators  
— Draglines  
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— Dust Collecting  
— Equipment & Supplies  
— Electric Motors  
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— Explosives & Dynamite  
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— Gasoline Engines  
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— Generator Sets  
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— Gypsum Plant Ma-  
— chinery  
— Hard Surfacing Ma-  
— terials  
— Hoists  
— Hoppers  
— Kilns: Rotary, Shaft,  
— Vertical

— Locomotives  
— Lubricants  
— Mills  
— Pulverizers  
— Pumps  
— Scales  
— Screen Cloth  
— Screens  
— Scrubbers: Crushed  
— Stone, Gravel  
— Shovels, Power

— Speed Reducers  
— Tanks, Storage  
— Tractors  
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— Trucks, Mixer Body  
— Trucks, Motor  
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— Welding & Cutting  
— Equipment  
— Winches  
— Wire Rope

If equipment you are in market for is not listed above, write it in the space below.

Send to:

Research Service Department

## ROCK PRODUCTS

309 W. Jackson Blvd.

Chicago 6, Illinois

Your Name \_\_\_\_\_ Title \_\_\_\_\_

Firm Name \_\_\_\_\_

Street \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_

CP-5

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**BESLITE**

**for BETTER  
concrete  
products**



**an unbeatable team for  
CONCRETE PROFITS**

**1. BESLITE** . . . the superior expanded clay lightweight aggregate specified by architects and builders for walls, floors, ceilings and roofs, to reduce dead weight, increase sound and heat insulation, and add new beauty to exposed masonry.

Check these BESLITE properties and you, too, will specify BESLITE for all your structural and precast concrete products.

**LIGHTWEIGHT  
STRONG  
INSULATING  
FIRE-RESISTANT  
NON-CORROSIVE  
DURABLE  
UNIFORM  
ATTRACTIVE**

BESLITE is available to concrete products manufacturers and ready-mix concrete producers by truck, rail or barge, within 300 mile radius of Marietta, Ohio, plant. Two sizes, 1/2" to #4 and minus #4.

**2. MARIETTA** . . . the modern industrial storage tanks made with BESLITE, Air-Cell or solid concrete staves, provide safe, permanent, durable storage for all your bulk raw materials and fuels. Tanks are available in any size, any arrangement to meet your present and future needs. Can be erected in a matter of weeks anywhere east of the Mississippi. For complete details on BESLITE, the superior lightweight aggregate . . . MARIETTA storage systems, write to:

**the MARIETTA  
CONCRETE corp.**

MARIETTA, OHIO

BRANCH OFFICES

509 FIFTH AVENUE

NEW YORK 17, N. Y.

PULASKI HWY. at RACE ROAD  
BALTIMORE 21, MD.

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City Park Garage, Pershing Square, Los Angeles, Calif. Archt. Stiles Clements, Associated Architects & Engineers; Constg. Engr.—Murray Erick Associates; Contrs.—Ford J. Twaitt Co.; Morrison-Knudsen Co., Inc.; and T-S Construction Engineers, Inc.; 50,000 Cu. Yds. of Pozzolith Ready-Mixed Concrete Supplied by Graham Brothers. All companies of Los Angeles, Calif.

## POZZOLITH READY-MIXED CONCRETE In World's Largest Underground Garage

To a long list of outstanding structures built with Pozzolith Ready-Mixed Concrete has been added this 2000-car underground garage.

Use of Pozzolith Concrete assured designed strength . . . also resulted in quicker re-use of slab shoring material—reducing costs and speeding up work; good concrete surface—holding down finishing cost of slabs.

Pozzolith's cement-dispersing, water-reducing and air-entraining action (making available the optimum amount of air) produces these further benefits:

1. Reduced Shrinkage — for less cracking.
2. Lower Permeability — for less "waterproofing" . . . later.
3. Increased bond-to-steel — for better construction.
4. Greater Durability — for lower maintenance costs.

*Full information and Pozzolith booklet on request.*

*Over 600 Leading Ready-Mixed Plants  
Are Producing Pozzolith Ready-Mixed Concrete*

### Over 600 Leading Ready-Mixed Plants are now equipped with the POZZOLITH AUTOMATIC DISPENSER

*Here's Why . . .*

Because a producer can, at lower cost:

1. Produce concrete of low permeability . . . with normal Portland cement.
2. Produce high-early strength concrete . . . with normal Portland cement.
3. Produce air-entrained concrete without strength loss . . . with normal Portland cement.
4. Produce all of the above properties out of one cement bin . . . with normal Portland cement — stepping up production; reducing inconvenience in handling and cutting costs.

*In normal mixes, concrete of any given durability, strength and workability, is produced more economically with Pozzolith than by any other means.*

*The*

**MASTER**



**BUILDERS**

*Co*

LEVELAND 3, OHIO

Subsidiary of American-Marietta Company

TORONTO, ONTARIO

# STEARNS 15

"...the finest and fastest block machine in the industry!"

## KANKAKEE BLOCK COMPANY

Concrete and Lite Weight Blocks  
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TELEPHONE DIAL 5-2411

W. E. REISING  
R. L. REISING  
DONALD LA COSTE  
L. BAUER

March 18, 1952

Stearns Manufacturing Co.  
Adrian, Michigan

Gentlemen:

We believe we have one of the finest and most modern block plants in the world. We started operation in November of 1951, and our production record shows the Stearns 15 to be the finest and fastest block machine in the industry.

We all know that elimination of down time charged to the block machine is one of the most important factors for a successful operation. Our down time has been practically nil.

Upon request, I will be more than glad to furnish the exact down time in minutes, as I keep a daily log. Stearns can certainly be proud of this record.

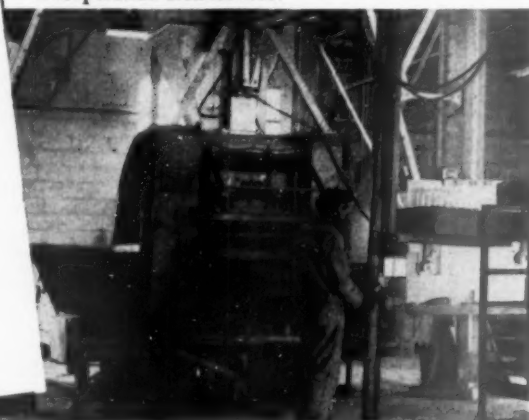
It goes without saying that our block is second to none in regard to strength, texture and uniformity of dimension.

It has been a pleasure to do business with Stearns. We have found that no request has been too big or too small. They have always given any request their prompt attention.

Yours very truly,  
R. J. Soleau  
KANKAKEE BLOCK CO., INC.  
Plant Manager

**DON'T MISS THIS LETTER from one of the most modern, up-to-date, all-Stearns concrete block plants in the world!**

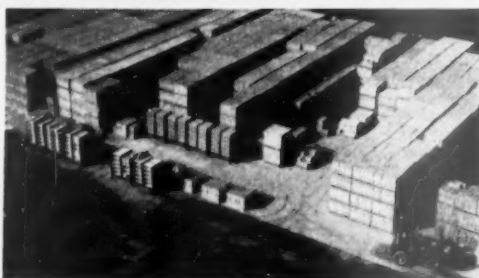
Six months' operation—"down time . . . practically nil"—the record of this one-man, fully automatic, plain pallet, Stearns 15 Concrete Block Machine in Kankakee, Ill. Smooth, uniform pallet delivery. 3 blocks per cycle—12 to 18 per minute. Dense, sharp-cornered blocks through Dual Shaft Vibration. Push-button control. Sturdy. Compact. Exceptional cleanliness.



Activity, enthusiasm, success—with Stearns right behind them! Kankakee Block executives from left are: R. J. Soleau, plant manager; Donald LaCoste, v. p.; R. L. Reising, president; W. E. Reising, v.p. L. L. Bauer is secretary-treasurer.



The 10-acre Kankakee Block plant is Stearns from the ground up!—the 15 with pallet return, offbearer and magnetic pick-up, 50-cu. ft. mixer.



From tower, Stearns 15 blocks—"second to none in regard to strength, texture and uniformity of dimensions"—resemble huge factory building, as they wait for delivery to builders within 50 miles.

## ANOTHER SATISFIED CUSTOMER!

# STEARNS

MANUFACTURING COMPANY, INC.

ADRIAN • MICHIGAN

**RECORD SALES  
SPEAK FOR THEMSELVES**



STEARNS 15



STEARNS 50



JOLTCRETES



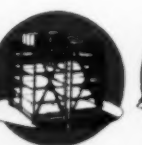
ZIPPER



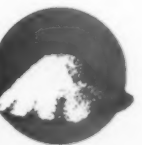
MIXERS



SKIP LOADERS



TURNABLES

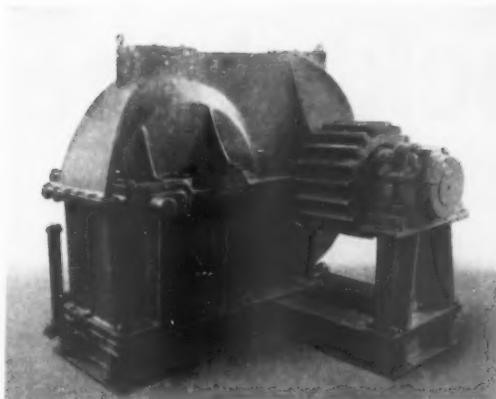


SINTERLITE





Vulcan is equipped to produce cast-steel gear rings, with machine-cut teeth, up to 24 ft. in diameter and 40" face.



Enclosed type of Speed-Reducer Drive Unit now usually provided for Vulcan Kilns. Old-style open-type drive units are still furnished when required for replacement on older kiln installations.



Typical Replacement Tire Section being finished up for shipment from a Vulcan Shop. Tire is one-piece steel casting.

## NOW IS THE TIME TO ORDER REPLACEMENT PARTS for your Rotary Kilns, Coolers, Dryers, Retorts, Etc.

At the present time we can still make reasonably prompt delivery on all of the various types of replacement parts here illustrated and described. No one can foretell the future but why take chances? If you are not already equipped to make quick replacement of all worn or weak parts you have everything to gain and nothing to lose by placing your orders NOW.

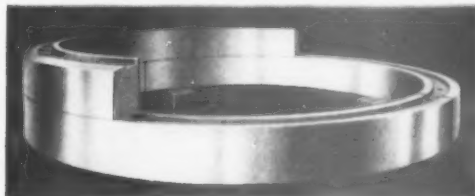
There are other good reasons why you should order replacement parts from Vulcan. Fifty years of widely varied experience, backed by a large steel foundry, an equally extensive steel fabricating plant and ample machine shops, especially equipped to handle large work, enable us to give superior service at competitive prices. Estimates submitted promptly on receipt of adequate working data.

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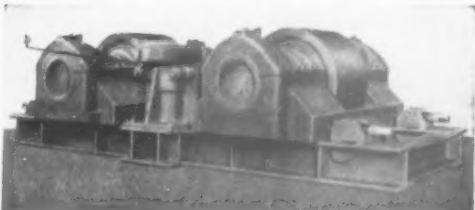
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Vulcan Welded Kiln-Shell Section ready for shipment. Shells or shell sections can be of any diameter up to the limit of railroad clearances. Unless otherwise specified all longitudinal joints are automatically welded. Intermediate circular joints are usually U-grooved and electrically welded, with suitable outside reinforcements.

Vulcan Shell Sections can be arranged for either field welding to the old sections of the shell or, if preferred, for field riveting to present circular butt straps. Shell sections can be furnished complete with tires and reinforcements attached to the section.



Vulcan Sectional Tires are widely used for replacement service and usually permit important savings in installation expense. Available in all sizes, for light or heavy service.



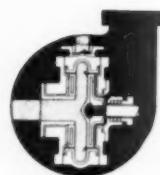
Standard Vulcan Assembly of Supporting Roller Bearings and Thrust Bearings for Rotary Kiln. Other types available for lighter service and also for very heavy service.



Old-Style Four-Roller Type of Supporting Roller Bearing. No longer recommended for new installations but still furnished for replacement on older installations.

# Let's look at the record

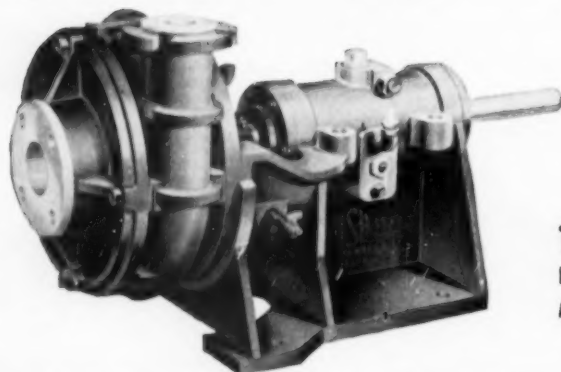
This unretouched photograph shows the Maximix Rubber Shell Liner from a Hydroseal Sand Pump after it was taken from service. Here's how it compared with a metal pump casing of conventional design previously used in the same service:



**Metal Pump Casing  
Conventional Sand Pump**

**Maximix Rubber Liner  
HYDROSEAL Sand Pump**

<b>WEIGHT OF PART</b>	<b>1,080</b>	<b>POUNDS</b>	<b>105</b>	<b>90% LESS</b>
<b>PUMPED PER DAY</b>	<b>4,000</b>	<b>TONS</b>	<b>11,000</b>	<b>175% MORE</b>
<b>SERVICE LIFE</b>	<b>100</b>	<b>DAYS</b>	<b>340</b>	<b>240% LONGER</b>
<b>TOTAL DELIVERY</b>	<b>400,000</b>	<b>TONS</b>	<b>3,740,000</b>	<b>835% MORE</b>
<b>COST PER TON</b>	<b>0.00284</b>	<b>\$</b>	<b>0.000065</b>	<b>98% LESS</b>



Results like this explain why Hydroseals are the choice of cost-conscious milling engineers the world over. Find out how their economy and efficiency can help you solve your pumping problem. Write for Catalog No. 451 today.

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MAXIMIX RUBBER PROTECTED**

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Let's get down to  
"brass tack" facts about

# CHEVROLET

## Advance-Design TRUCKS



### Fact No. 1

#### YOU PAY LESS TO BUY!

Get the price on the Chevrolet truck that's the right size, type and capacity for your work. You'll find that it lists for less than any other truck capable of doing the same job. Chevrolet has the lowest priced line in its field.

### Fact No. 2

#### YOU SAVE ON COST PER MILE

You can't beat Chevrolet's Valve-in-Head engine for over-all economy—fuel, oil, upkeep. It just keeps rolling along. And extra-rugged frame, hypoid rear axle, and Flexi-Mounted cab mean longer life, lower maintenance.

### Fact No. 3

#### YOU GET THE RIGHT TRUCK FOR THE JOB

No truck is worth the price if it doesn't get the job done—fast and sure. Chevrolet trucks are factory-matched to the payload, factory-matched to the job. There's a standard body and chassis, or chassis for special body, that's just right for your work.

### Fact No. 4

#### YOUR TRUCK INVESTMENT IS SAFER!

Comes time to trade in an old Chevrolet truck for a new one, here's good news: Year after year, used Chevrolet trucks traditionally bring more money compared to what they cost, than other makes. The demand is there, because Chevrolet trucks stand up better.

### CHEVROLET ADVANCE-DESIGN TRUCK FEATURES

**TWO GREAT VALVE-IN-HEAD ENGINES**—Loadmaster or the Thriftmaster—to give you greater power per gallon, lower cost per load • **POWER-JET CARBURETOR**—for smooth, quick acceleration response • **DIAPHRAGM SPRING CLUTCH**—for easy-action engagement • **SYNCHROMESH TRANSMISSION**—for fast, smooth

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## -to own

—because they are mass produced along with engines by the thousands for tough tractor service. Users benefit from these savings, as well as interchangeability of parts and other advantages of mass production.

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Ability to develop torque quickly makes A-C Power Units ideal for crushing and other sudden overload jobs.



## -to use

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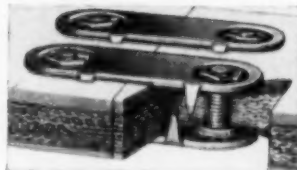
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TRACTOR DIVISION — MILWAUKEE 1, U.S.A.

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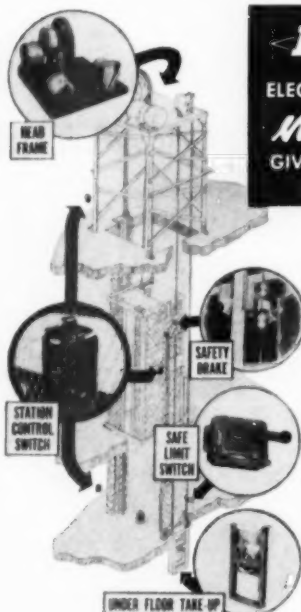


Compression Grip distributes strain over whole plate area

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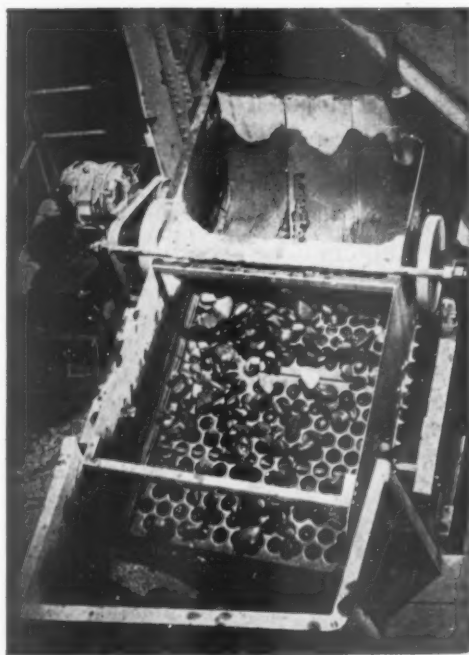
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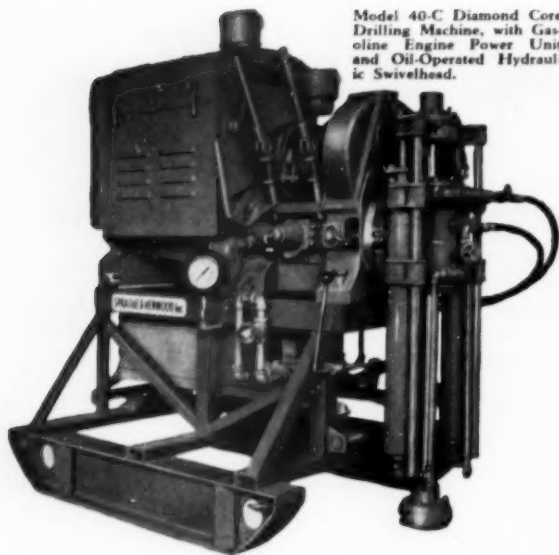
Both large and small mining and off-the-highway industries have learned LANDIS TRAILERS provide an easy, economical answer to hauling problems. LANDIS TRAILERS are not standardized . . . they're built to the special needs of *your* hauling job! Twenty-five years of designing specialized hauling equipment has given LANDIS' engineers job-proven trailer construction know-how. Hitch a LANDIS TRAILER behind a Caterpillar Tractor and see the results — more loads per day! . . . lower operating costs! . . . more net profits! LANDIS TRAILERS are hydraulically operated in end, side or bottom dump models. Write for additional information today.

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Model 40-C Diamond Core Drilling Machine, with Gasoline Engine Power Unit and Oil-Operated Hydraulic Swivelhead.

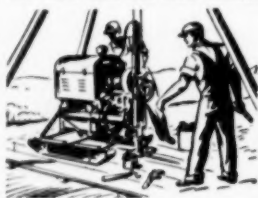
## MODEL 40-C

### THE BEST MACHINE for Most Core Drilling Jobs

This is our latest model — designed for highest possible percentage of good core recovery on jobs up to 1000 ft. in depth ( $\frac{3}{8}$ " core) no matter how severe the operating conditions. Rugged construction, liberal use of alloy-steel parts and anti-friction bearings throughout, permit long periods of high-speed drilling at minimum expense. Other modern machines and a complete line of improved accessory equipment provide for every drilling and sampling requirement. Write for catalog.

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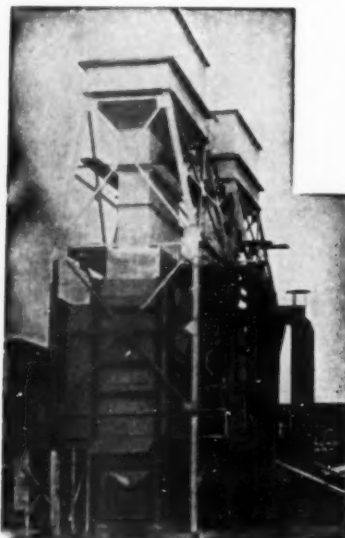
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**Exclusive  
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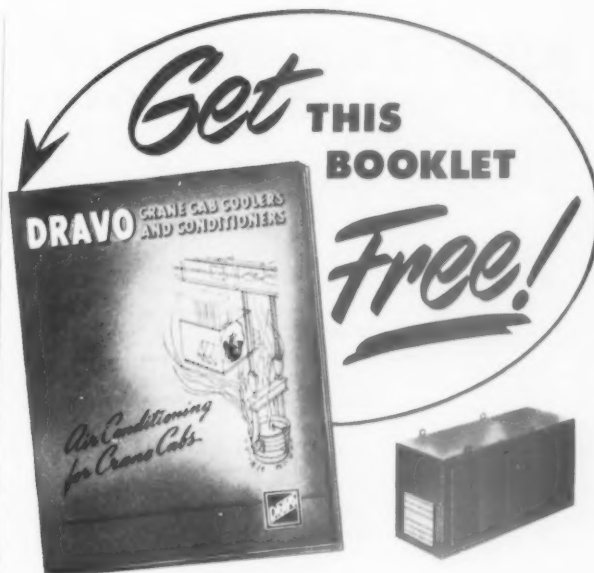
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One 24 inch Stedman Impact Crusher with new Impeller—Like new.  
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1—6' x 27' Louisville, with 42 stainless

steel tubes.

1—7' x 70' Louisville direct heat

3—Link-Belt Roto Louvre #1106-36,

#705-20 and #207-10 (27" dia. x

10' long.)

### VIBRATING SCREENS

3—"SELECTRO" 3' x 6' 2-deck, one 3' x 6' 1-deck all totally enclosed, heavy duty.

1—3' x 6' Colorado Iron Works, 1 deck.

1—4' x 8' Tyler Niagara, 3 decks.

8—Tyler Hammer Screens, 3' x 5', 4 x

5', 4 x 10'

### VACUUM FILTERS

1—8' x 12' Oliver acid proof, wood and lead.

2—4' x 4' Oliver, all bronze, top feed

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2—8' x 12' Oliver, all steel.

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1—American 6' dia. 2 disc. complete,

100 sq. ft. F.A.

### BRIQUETTE PRESS:

1—36" x 24" Komarek-Greaves, two roll.

### SIMPSON MIXERS:

18" No. 2—6", No. 3—8".

Also Shovels, Cranes, draglines; Jaw, Gyration and other crushers; Symons and Telsmith Cones; Complete Portable Crushing Plants; Rotary Kilns and Coolers; Air Compressors; Conveyors; etc.

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BARclay 7-0600

**PORTABLE CRUSHING & SCREENING PLANTS:** Pioneer 40-V, self-contained, with or without diesel power. Condition like NEW. 1—Pioneer 30 x 42 portable Jaw Crushing Outfit complete with all auxiliary equipment.

**CRUSHER, GYRATORY:** Teismith 16-B, all steel, 16" opening, 75 H.P. motor.

**CRUSHERS, JAW:** Sizes 12" x 15" to 48" x 60".

**CRUSHERS, REDUCTION:** Symons, Teismith, etc. 2', 3', 4' and 5½'.

**BLAST HOLE DRILLS:** 3—Bucyrus Erie 42-T, diesel and electric, 9" bits; Model 27 and 29T, diesel and gas, 6" bits and tools.

**BOILER:** Erie City 150 H.P., ASME code, HRT 150 lbs. pressure, 4" x 18" tubes, complete with all fittings.

**ELECTRIC MOTORS:** 2—NEW 1000 H.P., 1800 RPM, 2300 volt, drip proof with automatic switch gear, UNUSED. 1—950 H.P. Hoist Motor, 3 phase, 60 cycle 2200 volt, 443 RPM, with all control equipment.

**MINE HOISTS:** 150 H.P., 6'6" dia., 6'8" face; 250 H.P., 72" dia., 48" face; 300 H.P., double drums, one clutched, 8' dia., 4' face. All 3 phase, 60 cycle, 2200 volt with control equipment. Head Frame for double shaft 16'9" x 17'2", height 55', with or without 8" dia. sheaves for 1½" rope. Other Hoists 100 H.P. to 1650 H.P., single and double drum with electric equipment.

**COMPRESSORS:** Worthington DC2, 29 18½ x 21, motor 600 H.P. synchronous, 440 volt, with all auxiliary equipment. 4—Ingersoll Rand Diesel portable, 500 cu. ft. @ 100 lbs. pressure, New 1951.

**MONO RAIL CRANE:** 3 tons capacity with 1 cu. yd. Hayward motor driven clam shell bucket, 220 volt, D.C.; 100 ft. runway.

**DIESEL MOTOR:** Caterpillar D13000 portable on skids, 122 H.P.

**DRYERS or KILNS:** 2—10' x 90' heavy duty, with or without auxiliary equipment, condition like NEW. Located Minnesota.

**AIR SEPARATORS:** 1—Raymond, 1—Sturtevant and 1—Clayco 16" with 220/440 volt motors. Used only six months on material only slightly abrasive.

**PULVERIZERS:** Hardinge 5' x 22", steel lined, Ball Mill, complete with disc feeder and 30 H.P. motor. Marcy 8' x 12". Rod Mill, double end, center discharge 500 H.P. motor. 1—3' x 4' Rimco Ball Mill complete with liners, ball charge, V-belt drive and 30 H.P. motor and control. NEW, UNUSED.

**CLASSIFIERS:** 4—Akins 54" Simplex single pitch, Weir type, 220/440 volt motors; used four months. Located Nevada.

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**LOCI WASHERS:** 25', heavy duty type, with 2 logs, 6" x 6" x ¾" angles, complete.

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Lansdowne, Pa.

Phila. Phones: MAdition 3-8300—3-8301

Portable Crushing Plants: 880 Jr. Gravelmaster 100 yd. per hr. Teismith w/2536 crusher.  
**CRUSHERS:** 9x16, 10x20 Univ. 10x36 Gruender 15x36 Pioneer, 19x36 Farrell & Univ. 20x36 Eagle, 24x36 Farrell, 48x36 Nordberg & Farrell. JAW: #25 Kennedy, 11B, 16B & 48" Teismith, Allis 322R, 7' 10" & 14" Newhouse GYR. 5½" Symons CONE 18x24 & 54x21 McLanahan 961. Roll. 40x22 Diamond Dbl. Roll. 25 ton Cableway complete, 460' Steel CONVEYOR 43" x 14, 43x40, 52x20, 65x40, 71x50 DRYERS: 30" x 8' & 36" x 12' Apron Feeders. Caterpillar D13000 Eng. & D1600 Gen. Set NW25, Osgood 1½ yd., 2T Monighan DRAG-LINES.  
**SHOVELS:** ½ yd. Byers, ¾ yd. Koehring ¾ yd. Link Belt L875, Buckeye 70, Lorain L41, 1½ yd. NW 5 & 6, Lorain 77B & 79, Marion 362, NW 78, 80D & 95, Lima 1201, Marion 40A, 11M & 392 Link Belt K580, Bucyrus 52B, 54B, 80B Elec.

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Pulverizer  
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48" Symons vert. disc.  
24"x24" single roll, Fairfield.  
Bartlett & Snow, 14"x16", 2 roll.  
Bartlett & Snow, 24"x24", single roll.  
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4700 CFM, Buell, type AC-130 9½ AL.  
SS lined (6).  
10,000 CFM, Birmingham, cyclone.  
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1000 CFM, Dracoo type AAA, 3'10" x 15'.

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5'x22" Smidth, Tube.  
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6'x8" Abbe, style GPH, Pebble.  
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New Motor Complete 1951  
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- 1—3x8 SELECTRO VIBRATING 2 DECK.
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- 2—No. 9 DRY PANS COMPLETELY REBUILT.

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- 1—7'x28'.

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Telsmith 20-B Primary Gyratory Crusher.  
Telsmith 48" Gyrasphere with 100 HP elec. motor.  
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Cedar Rapids 4032 Hammermill, Diesel powered.  
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Manitowoc Model 3500 Dragline, New 1952.  
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JAW: Acme 10x20, 14x26, 14x28, 10x12, 16x32, 18x32, 25x40, Eagle 20x30.  
Cedar Rapids 10x20, 30x36, 25x40, Farrell 10x20, 13x20, 14x26, 18x36, 30x48, Buchanan 30x12, Good Roads Reliance 15x20, Traylor 18x36, 24x36, Allis-Chalmers 30x18, Good Roads 10x30, Telsmith 18x32, Champion 1030, 1040, 1236, 1530.  
**GYRATORY**: Allis-Chalmers McCully, 6", 7 1/2", 8", 9", 12K, 20", 30", 42", 14", Newhouse, 24", 36", Gyrasphere, 18", 28", Intercone Telsmith, Telsmith 5H, 10 H, 13 H, 16 H, Kennedy Van Saun 7, 10, 25 1/2 H, 37, Traylor Ty 1 1/2", Ty 2 1/2", T-4 1/2".

**ROLL**: Allis-Chalmers 54x24, Diamond 40x22, Pioneer 30x18, Telsmith 24x16, Pioneer 30"x18", New Holland 24x16.

**HAMMERMILL**: Niles 4 Williams Jumbo, Pennsylvania 8X2, 22x22, Cedar Rapids 20x30, Jeffrey 30x12, Jeffrey 30x24, 30x40, Dixie 30x50.

**BALL MILL**: Allis-Chalmers 4'x4', 5'x4', Kennedy Van Saun 7'x5', New 4'x4', Hardinge 6'x4', Colorado Iron Works 5'x6', Marcy No. 64's, Hardinge conical 10'x36".

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**CONE**: Symons 2' coarse bowl, 3' short head, 4' standard coarse bowl.

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McArter complete plant 3000# large capacity condition excellent.  
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Dings 20"x36" complete.

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Above located in Wyoming

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new Chrysler 8 cyl. engine, gas.  
Guaranteed.

1—RELIANCE Reconditioned Jaw  
crusher, 10" x 18" opening, twin  
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Guaranteed.

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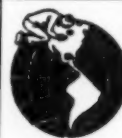
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A-3336

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terial. Air is blown into the cement, water and gravel during mixing. Test results have shown that air-gravel concrete is strong enough for floors or lightly loaded walls. It averaged 30 lb. less in weight per cu. ft., provided about twice as much insulation as ordinary concrete, and absorbed less moisture, according to the report. It was further stated that freezing and thawing tests that brought ordinary concrete almost to the point of failure, actually improved the structure of the air-gravel concrete. Its success was said to depend primarily on development of a method of controlling the air content.

### Opens Ready-Mix Plant

ROY J. CAMPBELL & SON, Arvada, Colo., recently opened a ready-mixed concrete plant in Arvada. The product will be known as Suburban Reddi-Mix Concrete.

### Concrete Fact Book

AUTOLENE LUBRICANTS Co., Denver, Colo., has published a new and enlarged edition of the "Protex Modern Placement of Concrete" fact book, containing technical information and field use tips on air-entrained concrete. It is in the form of questions and answers and contains many photographs of recent concrete construction projects. Copies of the new edition are available by writing to Autolene Lubricants Co.

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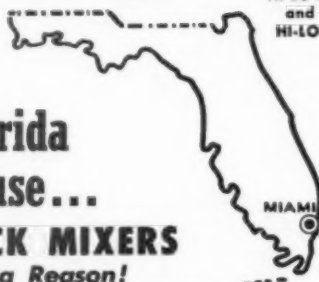
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